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# RENEWABLE ENERGY WITH A FOCUS ON CELLULOSIC ETHANOL AND BIODIESEL

HEARING  
BEFORE A  
SUBCOMMITTEE OF THE  
COMMITTEE ON APPROPRIATIONS  
UNITED STATES SENATE  
ONE HUNDRED NINTH CONGRESS  
SECOND SESSION

**SPECIAL HEARING**

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## **RENEWABLE ENERGY WITH A FOCUS ON CELLULOSIC ETHANOL AND BIODIESEL**

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**SATURDAY, AUGUST 26, 2006**

**U.S. SENATE,  
SUBCOMMITTEE ON AGRICULTURE, RURAL  
DEVELOPMENT, AND RELATED AGENCIES,  
COMMITTEE ON APPROPRIATIONS,  
*Sidney, MT.***

The subcommittee met at 9:30 a.m., at the USDA ARS Northern Plains Agricultural Research Laboratory, Sidney, Montana, Hon. Conrad Burns presiding.

Present: Senator Burns.

### **OPENING STATEMENT OF SENATOR CONRAD BURNS**

Senator BURNS. We will call the committee to order, and this morning this is the Senate Subcommittee on Appropriations for Agriculture, which I am a member of that subcommittee; and thank you to the chairman of the subcommittee, which is Senator Bennett from Utah, and of course our chairman of the full committee, Senator Cochran from Mississippi.

Today we're going to be talking about alternative fuels and renewables. There's been a lot of attention paid lately on renewable fuels, and I think today's hearing will give us a good sense of the state of this emerging industry, especially here in Montana.

I think we have a great opportunity here to make agriculture part of the solution in the energy independence, and to bring economic growth to rural Montana and rural areas across America.

As you know, agriculture is the backbone and probably the largest contributor to the GDP of just about every State in the union, although a lot of States won't admit that, but it is, because renewables are a vital part of the GDP to the Nation. Biofuels might not be the silver bullet for agriculture, but there's potential for improving the future of our farms and ranches, especially for our young farmers and beginning producers going back on the farm.

But in order to be successful, we need to continue research and development of new technologies. I don't think we can sustain an energy policy that creates competition between food and fuel, so I'm hopeful that Montana can lead the Nation in developing cellulosic ethanol as well as biodiesel. To me, that is the future of our renewable fuels. We need to be using wheat straw and biomass to make fuel, but the technology in that area is just at the early stages, and some folks thought we had almost a breakthrough in it, we are still far—well not too far, but we're not there yet of perfecting this technology.

We are also going to need to think through on our infrastructure and the needs it will take to support independent strategies. I know the folks here in Sidney, Montana understand that well. We are having another oil boom in Sidney, Montana and Richland County, but we don't have enough refining or pipeline capacity to support the production that we can get from this part of the world. Our ability to capture all the value of energy production is harmed by the lack of infrastructure, and that's a national issue that we need to pay some serious attention to.

I want to thank our witnesses for coming today. We're going to start this morning with the producer panel because I think it's important that the folks that represent our Federal Government hear from them and really listen to the producer groups and see what they have to say. All of your written statements will be included in the record in their entirety. I would ask you might keep your statements brief so we can get the questions and have some good discussions this morning because I believe it's the give and take that we will have at this table that will solve some of our problems; but I think here's where we are. The real intent of this hearing is to bring some reality to our renewables and our alternative fuels. Where we are and what it's going to take to get from A—from the point A to point B, and I think that's very important that we sit on—we just don't talk about theories, that we actually talk about what it's going to take to get up and solve this energy thing that we're facing in the years to come.

So, with that, like all good prepared chairmen, where is my list of witnesses this morning? Do we have any? Where? Oh, good. I covered it up. And I think if everything works out right, I think we will find some reality in this, and then we can deal with the challenges that we have in front of us.

Our first panel, and of course a good friend of mine, Dan Downs, and he's representing the Montana Farmers Union this morning, and they asked for you to start, so you will be the first target. Mr Downs. And thank you for coming this morning.

**STATEMENT OF DAN DOWNS, BOARD OF DIRECTORS, MONTANA FARMERS UNION**

Mr. DOWNS. I don't have to do better than someone else, other than you, and that's all right.

All right, my name's Dan Downs. I am on the Board of Directors for Montana Farmers Union. I also farm and ranch, and I have a grain business in Billings, Montana.

I have this all wrote out, and I'm probably not going to follow it, because I never do; but 3 years ago I got very excited about—thanks to MSU up in Bozeman, I got very excited about biodiesel and biolubricants. Duane Johnson came down and presented a program to us, and I saw an opportunity at that time to really turn this into something that would be from the producers of Montana. And for us, the way the price of wheat is—at that time cows weren't as good as they are now—it looked like a real opportunity for us to turn it into our own little boom in oil production. So we started working at that time.

Since then we have developed a small cooperative with the hopes of not only building a crushing facility, but also building a bio re-

finery. We want this to be in south central Montana, where—some-where on the main line. We were currently looking at two different opportunities, one at Huntley and one at Hardin. We have a lot of interest through rail link—Montana Rail Link. They are very ex-cited about working with us. So that has actually turned us from Hardin to an opportunity possibly at Huntley, and the Huntley people are excited about it, too.

Our original goal was to crush all across Montana. We wanted to have satellite crushing facilities so, like Conrad mentioned a minute ago, you know, if we put all this in one location, what good does that do because we're going to have all this, for example, live-stock feed in one spot. So our goal is to have a satellite crushing facility located in areas where we could take advantage of the feed stocks; and we take advantage of the feed stocks in those locations, that might prove for an opportunity to provide feeding facilities, feed lots, in different locations, which again helps in the transpor-tation of livestock around the State. If we keep them local, the guys don't have to go very far. Even if you're swarming the cows up, that's fine, not finishing. At least we have that scattered throughout Montana, which puts jobs throughout Montana. Again, a good deal.

If we can crush in these satellite locations instead of shipping, you know, bulk product into the central Montana area, we're ship-ping oil, which of course is a third less, or more than that.

As far as Montana Farmers Union, we are very much behind anything that has alternative energy issues in it, whether it's wind, biomass, ethanol, biodiesel.

We need to be careful, I think as we go ahead, that we don't think we're going to solve the energy problem, because we're not. If you do the numbers, we can't produce that much. But we can make a definite dent in the amount of oil that we need to bring in. And again, if we can use that, produced here locally, the jobs are in Montana, you know, the economic advantages are here in Montana, it's going to be a huge boom for us.

And also you look at the chance for us to have alternative crops. For example, on my farm it's going to be wheat or barley; or we can have wheat or barley; or I guess we can have wheat or barley, you know, because that's the way it is. We've tried these other crops and it hasn't worked well. Well, thanks to MSU, they have been looking at some alternative crops. For example, safflower works for biodiesel. We have a new crop out there called camelina, and I'm sure a lot of people in here are aware of that, and it has potential.

I've been working with the experiment station at Huntley, which is doing a great job, and you know, there's 14 different varieties out there now that we're going to have to choose from. We've been growing it for the past 2 years. Again, thanks to MSU, I got my first 22 pounds of seed, and we planted it. That's all there was to get. We got it out of France. And we gave it a shot and it turned out pretty darn good; and this year we learned a little more; and as we go forward with this I think we're going to find out that there is an opportunity to use that, but it's not going to be the sil-ver bullet. We're going to need—you know, we're going to need eth-anol production; like I said, we can have safflower, we can have

soybeans. So anyway, if we look at it in a thought that we're going to supplement our current problem with good renewable energy, whether it's the wind, biomass biodiesel, or ethanol, I think we have the opportunity to really have this amount to something.

If you have any questions, I'm sitting here. You can read my statement, which I didn't follow at all, and but you can read it. But I have several answers, I told Conrad earlier, over at the hotel. Most of them will be lies, but I will answer you, because the one time I found there was a statistic that said that 33 percent of all facts are made up on the spot. So we do the best we can do. Thank you.

[The statement follows:]

#### PREPARED STATEMENT OF DAN DOWNS

Thank you, Chairman Bennett, for holding this field hearing and providing me the opportunity to testify before your committee regarding the issue of renewable energy, especially as it pertains to cellulosic ethanol and biodiesel. My name is Dan Downs. I serve on the Montana Farmers Union board of directors, and I operate a family farm and ranch operation near Molt, Montana. I also own a seed plant in Billings.

I first became interested in renewable fuels—and in particular biodiesel—several years ago. Since that time my interest has grown to the extent that I, and a group of other interested growers, have formed a cooperative called Montana Bio Industries. The cooperative's goal is to grow oil seed crops. A separate entity, most likely controlled by the grower members, plans to build a refinery and market the fuel and associated byproducts. The feasibility study has been completed and is favorable. The business plan is almost done and some of the financial support is in place, with more to be completed soon.

Our fundamental motivation is the belief that Montanans working together can provide opportunities for all: growers will benefit through the introduction of another crop to be used in rotation with current small grains grown; current in-state crushers will have additional work to schedule; construction and ongoing plant operations will provide local, decent paying jobs that, in turn, will keep people in their local communities, and we will have a refinery in the State. All these elements factored together equal statewide economic development that originates and stays in the State.

Just as important, we will have a new fuel source that has obvious economic and environmental benefits. If the current predictions I've heard about the expected cost increases in fossil fuel are even close to be realized, biofuels will be well able to compete economically and we will be able to keep costs in control on the farm.

#### *Fuels From the Farm*

Montana—and America—have been long known and respected for their contributions to the production of food and fiber. Now an emerging opportunity exists for crop, livestock and grass producers to become major producers of another essential commodity—energy.

We believe that the current fossil fuel based energy model is no longer sustainable. Our Nation—and our State—is looking for new energy solutions.

Just a cursory look at current events around the globe emphasizes that our fossil fuel-based economy is subject to increasingly precarious geopolitical forces in the Middle East and elsewhere. We support and are working toward a new sustainable economy that will rely increasingly on renewable sources of energy such as wind, solar, biomass, anaerobic digesters, and especially the ethanol and biodiesel based fuel programs, such as the Renewable Fuels Standard that has been promoted for years.

As I look around and visit with my neighbors and have seen what is happening in other parts of the country, it is clear that farmers and ranchers can be at the forefront of this revolution. American—and Montana—agriculture is well positioned to significantly expand its role in the development and implementation of new energy solutions. We can utilize the commodities we grow in innovative new ways to produce power, transportation fuels, and a new generation of biobased products and chemicals.

Energy, economic development, national security and environmental quality are inextricably linked. Home-grown energy solutions offer tremendous potential for

farmers and ranchers to capture more income; for rural communities to prosper; and for the Nation to lessen its dependence on foreign oil.

It is our belief that foreign imports of renewable energy products should be looked at closely. They threaten the emerging U.S. renewable energy sector and our goal of developing and growing our energy independence.

America's farms and ranches can produce important fuels and feedstock needed to help our Nation improve energy security. Through emerging technology we can dramatically increase the production of liquid transportation fuels. We can generate electricity by harnessing wind and solar energy and capture and convert biogas emissions. And, we can produce biomass and turn crop residues, ag byproducts and wastes into value added energy feedstocks.

This linkage between local agriculture and renewable energy is the key to diversifying our energy markets and creating new economic opportunity for rural America.

We support a number of initiatives to achieve this economic opportunity fueled by renewable sources, including:

- More research to quantify the non-monetary value of renewable fuels to help policymakers determine the appropriate level of local, State and Federal support for renewable energy and fuel programs;
- The Community-Based Energy Development Ownership model accomplished in Minnesota, be adopted by other States and also used by Congress in developing national wind energy related policies;
- Using Congressional extension of production tax credits to provide financial incentives for community-based wind energy development;
- Establishing a national Renewable Portfolio Standard (RPS) of 25 percent by 2025 that includes a strong local ownership component;
- Expansion and acceleration of the Renewable Fuels Standard, to triple the current demand for ethanol used in U.S. gasoline over the next 10 years;
- Establishment of a separate national mandate for the production, use and distribution of non-gas fuels such as biodiesel;
- Creating a farm-stored Strategic Renewable Energy/Biofuels Reserve, dedicated to biofuels and energy feedstocks storage and production, to ensure a dependable long-term supply of the raw materials that are critical to the uninterrupted operation of the renewable biofuels/energy industry;
- Full restoration of funding for existing 2002 farm bill legislation including Federal financing for wind, biomass, solar, and energy efficiency;
- Exploring creative methods to increase demand for renewable energy sources, such as blander pumps; and
- Prohibiting imports of foreign sources of renewable energy products.

For many of us here in Montana, the bottom line is "how can we keep our agriculture sector healthy." With an energized emphasis on "fuels from the farm", we can expect increased farm income; added value uses for crops, livestock and by products; alternative agriculture and rural enterprises; more productive uses of marginal land; resolution of air, water and soil quality problems; lower energy input costs; increased reliance on new markets to maintain the viability of U.S. agriculture; enhanced rural economies; and increased public support and respect.

Historically, almost all forms of fossil energy produced in the United States have enjoyed some form of government subsidies. The current higher cost of renewable energy and renewable fuels production does not reflect the environmental and energy security benefits of replacing petroleum based fuels and other fossil based energy sources.

In conclusion, I want to note that as a part of a shrinking pool of independent family farmers across America, I speak with the interests of those independent producers in mind. Corporate American agriculture seems to be doing quite well in terms of its economic stability.

My goal today is to highlight the economic interests of independent family farmers and ranchers who founded this great country. Every politician, voter, taxpayer, environmentalist, consumer—and so on—needs to realize independent family farmers are by far the best stewards of the land and animals. The independent, localized family farm structure has a proven track record of success in America. Straying from this proven structure jeopardizes the United States' national strategic security, homeland security, the environment, rural economic development, food safety and food quality and now energy independence. Federal agricultural policy, with a strong energy component, that prioritizes the interests of independent family farmers and ranchers, is not vital just to the people on the land, but to our country. It is my hope that the committee will keep this in mind as it works to prepare future energy and farm policy.

I wish to thank the committee for this opportunity to testify; I am happy to answer any questions you might have.

Senator BURNS. Thank you, Mr. Downs. We have Jon Stoner this morning with us, with the Montana Grain Growers Association. Jon?

**STATEMENT OF JON STONER, PRESIDENT, MONTANA GRAIN GROWERS ASSOCIATION**

Mr. STONER. Thank you, Senator. I'll read my statement.

Mr. Chairman, my name is Jon Stoner, and I am a grain producer from Havre, Montana. I am currently serving as President of the Montana Grain Growers Association. I have been involved for the last 3 years with Peaks and Prairies. It's a Montana based company that produces bio-based oil and lubricants. Thanks for this opportunity to discuss my thoughts about renewable fuels and for bringing this hearing to Montana.

The recent proposal by President Bush to reduce America's dependency on foreign oil has been getting a lot of press, and I think the majority of the American public agrees that it's a good idea to reduce our dependency on foreign oil. Until the recent spike in fuel prices, the main focus of renewable fuels has been on—has been on corn-based ethanol. The corn producers have responded and a profitable new industry continues to expand. It's time for Montana to be part of this new industry and see what new ideas and solutions that we can bring to the table.

About 3 years ago several other farmers and I started Peaks and Prairies. We had some experience with alternative crops and wanted to find a way to add value to them. The goal of Peaks and Prairies is to develop a bio-based motor oil that is competitively priced and is a superior product, and we are getting close to finalizing our motor oil formula.

Currently the company produces several bio-based oils and lubricants. Some of our consisting products include: A penetrating oil, a bar chain oil, two-stroke motor oil, and dust suppressant. We also provide toll crushing to smaller Montana companies, and have several new products that are being developed right now.

I think so everybody should be excited about the possibilities of this emerging industry. We are only in the beginning stages of this technology, and I think the possibilities are endless. You know, tires, rubber, any product, whatever is made from petroleum, we can make it from oil seeds. In addition, our oil seed crushing process yields a high quality animal feed as a by-product.

We can make any lubricant that the petroleum industry makes from the high quality oil seed crops that we grow in Montana. These oils are biodegradable and they are environmentally friendly. We have been approached by several industries to produce lubricants for them. For example, the forestry industry, they are very interested in our bar chain oil, our hydraulic oil, our motor oil, to prevent petroleum based spills on our forest floors, and petroleum based hazardous residue on the wood that's cut. The mining and marine industries also see huge benefits with bio-based lubes as a way to improve energy performance from higher lubricity, higher fuel mileage, more power, and it's a product that is safe for the environment.

So, we need to prove to these industries that we can be a reliable supplier of lubricants at a price competitive with the petroleum

based products. We can answer this call and we can do it by offering our growers higher prices for the oil seeds they grow. This will create a great opportunity for Montana growers and our State by providing a chance to grow a premium product and get paid for it.

The challenge that we and other biobased companies in Montana face is access to the capital required to meet the high cost of entering this industry and competing with the large, established companies. The equipment to manufacture bio fuels and lubes efficiently and competitively is expensive. We estimate that we will have between \$2.5 and \$3 million in equipment for our processing facility. Low or zero cost loans and grants that would directly support this infrastructure would be extremely beneficial to emerging companies such as ours. And our equipment could be offered to others statewide to keep it running full time. Our plant could be a model not only for the State, but for the country as we move fully into the lubricant market.

Over 90 percent of the ethanol now produced in the United States is made from corn. But statistics show that additional renewable fuel sources will be needed to meet the challenge of becoming a more energy independent Nation. One source that holds promise for Montana's grain producers is the production of ethanol from cellulitic biomass, and we already have an abundance of the cellulitic feedstock in the form of wheat and barley straw. In addition, the development of a high biomass perennial grass like switchgrass offers an important opportunity for Montana producers to diversify and grow a new crop for a new market.

Developing new crops, creating opportunities for existing crops and building the infrastructure needed to process them takes time and does not come without risk. Additional research is needed at all stages of this developing industry. Research and ongoing education will have to show Montana producers that there is an economic benefit to their business before they will change established agronomic practices.

As we formulate ideas for the next farm bill, it is important to include the development of renewable fuels in the discussion. The safety net provided by the commodity section of the farm bill will continue to be most important to grain producers, and it's imperative that the money spent on the development of renewable fuels not come at the expense of the established commodity programs. Increased research dollars and growers' incentives like tax credits can be developed to encourage renewable fuel production. Montana grain producers are ready to meet the challenge.

I want to thank you for allowing me to testify, and I will answer any questions.

[The statement follows:]

#### PREPARED STATEMENT OF JON STONER

Mr. Chairman and Members of the Subcommittee, my name is Jon Stoner and I am a grain producer from Havre, Montana. I am currently serving as President of the Montana Grain Growers Association (MGGA) and I have been involved for 3 years with Peaks and Prairies, a Montana company that manufactures bio-based products. Thank you for this opportunity to discuss my thoughts about renewable fuels.

The recent proposal by President Bush to reduce America's dependency on foreign oil and minimize global warming through lower emissions has been getting a lot of press. I think the majority of the American public agrees that these are worthwhile

goals. Until the recent spike in fuel prices, the main focus of renewable fuels has been on corn-based ethanol. Corn producers have responded and a profitable new industry continues to expand. It's time for Montana to be a part of this new industry and see what new ideas and solutions wheat and barley producers can bring to the table.

About 3 years ago several other farmers and I started Peaks and Prairies. We had some experience with alternative crops and wanted to find a way to add value to them. The goal of Peaks and Prairies is to develop a bio-based motor oil that is competitively priced and is a superior product. We are getting close to finalizing the motor oil formula. Currently the company produces several bio-based products:

- Penetrating oil
- Bar chain oil
- 2-stroke motor oil

We also do toll crushing and have other products being developed.

Everyone should be excited about the possibilities of this emerging industry. We are only in the beginning stages of this technology and the possibilities are endless. Tires, belts, rubber products, whatever is made from petroleum can be made from oil seeds. In addition, our oil seed crushing process yields a high quality animal feed as a by-product.

We can make any lubricant that the petroleum industry makes from the high quality oil seed crops we grow in Montana, and these oils are biodegradable and environmentally friendly. We have been approached by several industries to produce lubricants for them. For example, the forestry industry is interested in the bar and chain oil product to prevent petroleum based oil spills on our forest floor and petroleum based hazardous residue on the wood that is cut. Mining and marine industries also see huge benefits with bio-based lubes as a way to improve engine performance from higher lubricity, higher fuel mileage and more power.

We need to prove to these industries that we can be a reliable supplier of lubricants at a price competitive with petroleum based products. We can answer this call and we can do it by offering our growers higher prices for the oil seeds they grow. This will create a great opportunity for Montana growers and our State by providing a chance to grow a premium product and get paid for it.

The challenge we and other new biobased companies in Montana face is access to the capital required to meet the high cost of entering this industry and competing with large, established companies like Cargill, Bunge and ADM. The equipment we need to manufacture biobased fuels efficiently and competitively is the 800-pound gorilla. We estimate that we will have between \$2.5 and \$3 million invested in the equipment we need for a processing facility. Low or zero cost loans and grants that would directly support this infrastructure would be extremely beneficial to emerging companies such as ours. Our equipment could be offered to others statewide to keep it running full time, creating additional jobs and spinning off smaller companies that process by-products. Our new plant could be a model not only for the State but also for the country as we move fully into the lubricant market.

Over 90 percent of the ethanol now produced in the United States is made from corn. But statistics show that additional renewable fuel sources will be needed in order to meet the challenge of becoming a more energy independent Nation. One source that holds great promise for Montana's grain producers is the production of ethanol from cellulosic biomass. Montana already produces an abundance of cellulosic feedstock in the form of wheat and barley straw and other plant material wastes. These largely untapped, low-cost resources could be a new source of income to farmers from existing acres. In addition, the development of high biomass perennial grasses like switchgrass offers an important opportunity for Montana producers to diversify and grow a new crop for a new market.

Developing new crops, creating opportunities for existing crops and building the infrastructure needed to process them takes time and does not come without risk. Additional research is needed at all stages of this developing industry. The recent announcement of grant funding from the Department of Energy for demonstration biomass-to-ethanol refineries is a step in the right direction. Additional dollars are needed for research at the producer level though. For existing crops there may be additional costs required for storage, transportation, and new farm equipment. New, improved varieties for biomass ethanol use can take several years of research before becoming available to the farmer and it can take up to 3 years to establish a new perennial grass like switchgrass. Research and ongoing education will have to show Montana producers that there is an economic benefit to their business before they will change established agronomic practices.

As we begin to formulate ideas for the next farm bill, it is important to include the development of renewable fuels in the discussion. The safety net provided by the commodity section of the farm bill will continue to be most important to Mon-

tana's grain producers. It is imperative that the money spent on development of renewable fuels not come at the expense of established commodity programs. Increased research dollars and grower incentives like tax credits can be developed to encourage renewable fuel production. Montana grain producers are ready to meet the challenge.

Senator BURNS. Thank you very much, Mr. Stoner, and I appreciate that, and I've got a couple questions, but we will get back to you in just a little bit.

We have Jerry Bergman here, Dr. Jerry Bergman, with Montana State University; and good to see you again over here.

**STATEMENT OF DR. JERALD W. BERGMAN, MONTANA STATE UNIVERSITY**

Dr. BERGMAN. Thank you, Senator Burns. It is in deed a privilege to testify today. I'll briefly cover some of the written statement that I've made.

The supply chain for vegetable oil-based biodiesel and other bio-based products is in place in eastern Montana and western North Dakota, the MonDak region, and ready for expansion. It is possible to grow oil seeds on one-third of our crop acres, an estimated 10 million crop acres in eastern Montana and western North Dakota; and with the high oil seed content oil seeds that we can grow, we can produce more oil per acre here than they can with soybeans in the soybean growing regions of the United States.

The MSU Eastern Ag Research Center is evaluating all these high oil seeds crops that's under production here right now, and we will produce biodiesel from each of these high oil oil seeds and determine their fuel related properties for biodiesel and for bio lubricants.

The research here is also developing high oleic safflowers with 45 to 50 percent seed oil content, improved oxidative stability, with improved antioxidant, and improved meal co-products. These varieties will be able to be grown in all semiarid regions of Montanan and western United States.

We are also developing a research project to promote the use of biomass. This experiment is being done at two research sites in western North Dakota, in the Nesson Valley. There we are growing and comparing switchgrass to perennial grasses that are adapted to our region. These grass species include switchgrass, tall wheat grass, intermediate wheat grass, Big Bluestem, and Altai Wildrye. We also have CRP mixes to test for this biomass study. There are over 1.8 million acres of CRP in northeast Montanan and northwest North Dakota alone. These CRP acres could easily be converted to biomass production for ethanol.

There is a regional partnership that exists here between the Montana State University Eastern Ag Research Center, the North Dakota State Williston Research Center, and the USDA Northern Agricultural Research Laboratory, that is strategically located to conduct renewable energy research and development to promote the renewable energy industry in Montana, North Dakota, and other regions of the Nation.

I thank you for the privilege to visit.  
 [The statement follows:]

## PREPARED STATEMENT OF JERALD W. BERGMAN

**Mr. Chairman and Members of the Agriculture, Rural Development, and Related Agencies Subcommittee:** The supply chain for vegetable oil-based biodiesel and other biobased products is in place in eastern Montana and western North Dakota (MonDak region) and ready for expansion. It is possible to grow oilseeds on one-third of the estimated 10 million crop acres in eastern Montana and western North Dakota. It is interesting to note that the MonDak region can produce more vegetable oil per acre with high oil content oilseeds (safflower, sunflower, canola, flax, and camelina) than soybeans in the soybean growing regions of the United States.

The Montana State University Eastern Agricultural Research Center in Sidney, MT is evaluating oilseed crops produced in Montana for use in the vegetable oil-based biodiesel production industry. Biodiesel will be produced utilizing a university research and development biodiesel production system. The unrefined vegetable oils of each oilseed crop will be converted to biodiesel and evaluated for fuel related properties as a replacement for or blend with petroleum biodiesels.

Research underway at the Montana State University Eastern Agricultural Research Center, Sidney, MT is developing high oleic safflower genetic lines with enhanced oxidative stability, improved meal co-products and seed oil content of 45–50 percent for commercial production in the MonDak region and other semi-arid growing regions of western United States. The low-saturate/high-oleic safflower oil with enhanced antioxidant levels has potential for bio-fuel, bio-lubricant, hydraulic oils, as well as livestock and human nutrition, cosmetics, and other industrial uses.

This research and development project will promote and facilitate the development of a new biodiesel/renewable energy industry in the MonDak region and other parts of western United States. The research is supported by the MSU Biobased Institute, MSU-Bozeman, and the Montana Department of Commerce, Helena, Montana. Oilseed processing and biodiesel/biolubricant production facilities are in the planning and development stages by economic development groups, private companies, and farm producers throughout Montana.

A biomass research project underway statewide in North Dakota has 2 research sites at the NDSU Williston Research Extension Research site in Nesson Valley, 23 miles northeast of Williston, ND to evaluate perennial herbaceous biomass crops for cellulosic fuel production under dryland and irrigated conditions. The 10-year bio-energy crops study will determine the appropriate grass species, harvest methods, and optimum agronomic producers to maintain productive perennial biomass stands. The economics of bioenergy crop production to improve farm income and the impact on soil organic matter and carbon storage will be evaluated. Grass species include switchgrass, tall wheatgrass, intermediate wheatgrass, Big Bluestem, and Altai Wildrye. There are over 1.8 million acres of CRP in northeast Montana and northwest North Dakota alone. These lands could easily be utilized for biomass production for cellulosic ethanol production.

Feedstock production research products will optimize agronomic practices, soil sustainability and environmentally sound production of bio-based products for renewable energy and support bioproducts/biodiesel refinery industries in our region.

A regional research and development partnership between Montana State University's Eastern Agricultural Research Center (MSU-EARC) in Sidney, MT, North Dakota State University's Williston Research Extension Center (NDSU-WREC) in Williston, ND and the USDA Agricultural Research Service's Northern Plains Agricultural Research Laboratory (USDA-ARS-NPARL) in Sidney, MT is strategically poised to readily expand collaborative renewable energy research and development efforts to benefit farmers, ranchers, and grow the renewable energy industry not only across the MonDak region but across the Nation.

**Senator BURNS.** Thank you Dr. Bergman.

We have Mr. Garth Kallevig, Stockman Bank here in Sidney, speaking on behalf of the Montana Independent Bankers Association. Thank you for coming this morning. Appreciate that.

**STATEMENT OF GARTH KALLEVIG, ON BEHALF OF THE MONTANA INDEPENDENT BANKERS ASSOCIATION**

Mr. KALLEVIG. Thank you, Senator Burns, and I am very pleased to be here and represent the Montana Independent Bankers Association.

As bankers representing Montana's large and small communities, we are thankful to be part of this discussion.

Progressive technology together with runaway oil prices has spurred a renewable energy boom, and in and of itself the development of alternative fuels provides a great opportunity to develop the economy of rural America; and it's our great desire and the desire of our colleagues across the State to be part of this program.

However, if rural America and especially rural Montana is to survive, it is vital that rural communities are at the table, working to create opportunity for local producers and developers, and advocating for changes in public policy that will revive, restore and sustain small communities across our State.

Bankers involved in the Montana ethanol project in the 1980s saw some of these projects fail, and some reasons cited with the bankers that I visited with across the State were these: Oil prices fell and ethanol was no longer competitive with gasoline and demand plummeted. Tax laws and tax credits were constantly changing, and that created a lot of uncertainty. And limited capital with some of these projects resulted in small hand to mouth operations. And inexperienced management.

We wish that we were able to do more in this regard; however, as bankers in small communities, we are especially accountable to our stockholders to do the necessary due diligence that produces responsible investments. We evaluate every project that comes into our offices for the necessary elements of a successful project, including their equity, their management structure, their business plan, and their available expertise, and marketing plan.

And we look at this renewable energy as an opportunity, maybe not for the primary financing of these projects. A lot of the small rural independent banks, depending on the size of these projects, would be difficult for them; and it may even be difficult for the larger banks, depending on the size of some of these projects.

In my opinion, the secondary financing that could be available for banks is the biggest opportunity that I see as far as ag producers expanding their land and their acreage and their equipment. We're going to have housing and land development for community growth that is sure to follow if these projects come to fruition, loans to new and existing businesses for expansions for service and products that will be part of this rural economic development. And also loans to local individuals and corporate people that invest in these projects.

We understand that much of the funding for large biofuel projects comes from out of State sources, and our desire is to be part of the equation in any way that we can be in assistance to local producers.

We're anxious to play any role possible in helping to draft or review language on this issue for inclusion into a final bill.

And we thank you for allowing us the presence to speak here.  
[The statement follows:]

#### PREPARED STATEMENT OF GARTH KALLEVIG

I am deeply honored to be invited to participate as a member of this prestigious panel, on behalf of Montana's independent community banks.

Progressive technology together with runaway oil prices has spurred a renewable energy boom. In and of itself, the development of alternative fuels provides great opportunity to develop the economy of rural America, which is my great desire and the desire of my colleagues across the State.

The issue of renewable energy development becomes even more compelling as a valuable component of the national energy strategy to reduce our dependence on foreign oil and lower the costs of energy for Americans.

As bankers representing Montana's large and small communities, we are thrilled to be a part of this discussion. At first blush, our inclusion on this panel may appear to be a bit premature.

However, if rural America, and especially rural Montana, is to survive, it is vital that rural communities are at the table, working to create opportunity for local producers and developers, and advocating for changes in public policy that will revive, restore and sustain small communities across larger regions.

Bankers involved with Montana ethanol projects in the 80's saw these projects fail. Reasons cited for failure which need to be addressed to reduce the risks for all biofuels include:

- “Oil prices fell and ethanol was no longer competitive with gasoline and demand plummeted”
- “Tax Laws and Tax Credits were constantly changing, creating uncertainty”
- “Limited capital which resulted in small hand to mouth operations”
- “Inexperienced Management”

We wish that we were able to do more in this regard. However, as bankers in small communities, we are especially accountable to all of our stockholders to do the necessary due diligence that produces responsible investments. We evaluate every project that comes into our offices for the necessary elements of a successful project, including their equity, management structure, business plan, available expertise, and marketing plans.

We understand that much of the funding for large biofuels projects comes from out-of-state sources. Our desire is to be a part of the equation in any way that we can be of assistance, to local producers, to local developers, or as part of a larger project, to aid the development of our local economies.

We are hopeful that the evolving agriculture bill will include provisions that create for local communities a meaningful role in the certain evolution of this dynamic new component of the economy.

Of considerable assistance would be grants to smaller producers and developers, for feasibility studies and other costly parts of their plans. Incentives, guarantees and tax credits could also be valuable to producers, developers and banks. We also see a great need for assistance in marketing, foreign competition is a huge concern. Foreign production costs are substantially lower than in the United States. To be certain, we see many good ideas that come up short in each progressive phase of the process.

We would be anxious to play any role possible in helping to draft or review language on this issue for inclusion into the final bill.

The location of this important hearing, here in my home town, is a sign of hope in and of itself. We want to be partners in developing the rural economy of America, and in developing the fuels that will provide Americans with a sustainable and affordable source of energy.

We thank you for your presence with us, and look forward to working with you in the days ahead.

Senator BURNS. Thank you, Mr. Kallevig, and we appreciate your testimony.

We have Mr. Thad Willis this morning, Montana Farm Bureau.

**STATEMENT OF THAD WILLIS, FARMER, ON BEHALF OF THE MONTANA FARM BUREAU**

Mr. WILLIS. On behalf of the Montana Farm Bureau, its staff, members, Board of Directors, we would like to welcome you back to Montana, and we're greatful for the opportunity to testify on biodiesel today.

Senator BURNS. You figure out for my schedule how I can stay home just one day, would you let me know?

Mr. WILLIS. Well, okay. If we figure out how to get biodiesel to work, I'll get lot of days off for you.

Senator BURNS. You bet.

Mr. WILLIS. First of all, we would like to go over a few of the policies that American Farm Bureau has on the biodiesel as a

small business. The first is full research and development for increased production of all forms of renewable fuels and agriculture uses for energy use. The continued use of the Commodity Credit Corporation, funds of incentives to payment to producers of renewable fuels for new gallons of production. The establishment and enforcement of national qualities standards for biodiesel and ethanol. State and Federal tax credits that provide incentives for the use of alternative fuel, alternative based energy, and requiring that all new—requiring that all new gasoline powered vehicles to be capable of burning fuel containing a minimum of 85 percent ethanol blended gasoline.

In light of keeping our opening comments short, I'll just edit mine and you can read them if you need something to get you to sleep tonight.

In Montana one question that we're trying to figure out is how do we fit into this expanding ethanol equation? The last 20 years has shown corn to be the best source of ethanol. This is not a crop grown in great quantities in Montana, as small grains such as wheat and barley are the largest crops. We would like to see research continue to focus on making small grains more cost effective, especially with barley conversions to ethanol.

Biodiesel looks very promising for Montana. We would like to see new energy measures to include using extender biodiesel incentives and perhaps a mandate for biodiesel production incentives.

The camelina is a crop that we have grown on our farm for the last 3 years, and that's something that we—as we work with MSU, they have given us a lot of hope that we could use.

One thing that was brought up earlier by Farmers Union is that when you're done crushing camelina as a fuel, you have a by-product, and they are finding out that it's very high in omega-3 oils, which they are telling us is very good for humans and animals.

Some examples of the research that's going on right now is trout feed, which we have done at MSU in bozeman; chicken feed, for the high omega's in the eggs, which is being done in Georgia; dairy goat feed, which is high omega's in milk and cheese, and that's being done in Montana; and the experiment station in Havre is working on for beef cattle, but they are finding some very promising results.

So I think as we said earlier, rather than having one big plant in the State, let's try and have them regional so people can take advantage of the freight, the distribution, and the by-product for cattle feeds.

There are a few things that we would like to see, as we are giving you some ideas, Senator Burns, if you could go, is there two incentives currently given for the blenders at the rendering plant for biodiesel. There's a \$.50 for straight blending and \$1 for blending virgin oils. An additional \$.10 a gallon given to small producers which would be "on the farm use biodiesel," we would like to see that happen. These incentives are set sunset in 2008. We would like to see it extended to at least 2011.

Fuel for fertilizer costs have increased an average of 25 percent in the last year alone. Addressing how to keep energy input costs consistent and workable should be paramount to the importance of the upcoming farm bill.

Investing in research and industry infrastructure will be imperative so that when incentives to grow crops are given, there's an established market to sell them.

We would also like to see setting loan rates for alternative crops to give producers that backup market for those crops.

Agriculture is the renewable fuel source. Renewable fuels are not new, however continuing innovations have found more efficient production methods and have minimized adverse consequences of using them.

With renewable fuels, it's a win/win situation for U.S. agriculture and its citizens. Thank you.

[The statement follows:]

PREPARED STATEMENT OF THAD WILLIS

Chairman Burns and members of the Senate Agriculture Appropriations Subcommittee, my name is Thad Willis, a farmer from Big Sandy, Montana and immediate past Vice President of the American Farm Bureau Federation Young Farmer and Rancher Committee. Thank you for this opportunity to testify on the future of renewable fuels, with special emphasis on ethanol and biodiesel. On behalf of our members, board of directors, and staff, Montana Farm Bureau Federation welcomes you to the Big Sky State, and is pleased to make official comments with special emphasis on Western agricultural practices.

Montana Farm Bureau Federation would like to thank Congress for passing comprehensive energy legislation last August, including a renewable fuels standard (RFS) calling for 7.5 billion gallons of renewable fuel by 2012. This is a great win for both ethanol and biodiesel.

Regarding biofuels and ethanol, American Farm Bureau Policy States the following:

We support:

- Private and public efforts to develop and promote new uses for agricultural products
- Research into the viability and economic potential of new agricultural products and commodities
- Production and use of agricultural based fuels
- Research and demonstration programs that use ethanol as a fuel for fuel cell engine development
- Retention and development of policies which support the biomass fuels industry
- Harvesting of lowland and riparian areas for biomass use
- Full research and development for the increased production of all forms of renewable fuels from agricultural resources for energy use
- Production of alcohol and biodiesel fuels from grain and other agricultural products. We urge industry and agricultural cooperatives to investigate and produce this fuel
- The continued use of Commodity Credit Corporation (CCC) funds as incentive payment to producers of renewable fuels for new gallons of production
- The establishment and enforcement of national quality standards for biodiesel and ethanol. Biodiesel shall be defined as a mono-alkyl ester of a long chained fatty acid derived from vegetable oils and/or animal fats meeting the specifications of American Society of Testing and Materials (ASTM) 6751 or its properly designated successor
- Mandates to require all diesel to be biodiesel blend and all gasoline be an ethanol blend
- State and Federal tax credits that provide incentives for the use of alternative ag-based energy
- Requiring all new gasoline powered vehicles to be capable of burning fuel containing a minimum of 85 percent ethanol blended gasoline
- Requiring new biofuels or renewable energy production facilities that utilize public funding, tax deferments or grants to offer a percentage of investment opportunity to local producers to keep gains realized in rural America
- The promotion, use and expansion of biofuels as an octane or cetane enhancer, fuel source, or lubricity agent to improve air quality. Our goal is expanding the use of biofuels to the maximum amount possible.

As you can see there are certain themes which consistently reoccur: Research, Develop, Promote, Incentives, Mandate, and Require. These are all words and policies

structured to establish an exciting new industry. Industries based on agricultural products can help ensure the health of our Nation's heritage and independence. An industry that once established will be very profitable, but will need these types of assistance if they are going to grow, and ultimately survive. Increasing the role of renewable energy will help ensure adequate energy supplies, stabilize energy costs, and reduce dependence on traditional energy resources. The availability of affordable domestic energy sources and the opportunities for renewable energy resources are vitally important. Ethanol and biodiesel research and incentives already in place show this is working.

Currently, within the ethanol industry, there is a rapid expansion under way in ethanol production as seen by a recent survey indicating the 7.5 billion gallons could be met in 2 years or less. The current annual estimated capacity of the U.S. ethanol is 4.5 billion gallons of ethanol. That number is expected to rise to 5 billion by this summer, and go to approximately 6 billion by the beginning of 2007. From that point forward it is more difficult to project, but if all the plants that are currently being planned are funded and built, total capacity could be close to 9 billion by 2010. Furthermore, if current plans for new plants and expansion are fulfilled, that number could be 10–12 billion gallons of ethanol by 2012.

In Montana one question we ask is; how do we fit into this expanding ethanol equation? The last 20 years have shown corn as the best source for ethanol. This is not a crop grown in great quantities in Montana as small grains (wheat and barley) are the largest crops. We would like to see research continue to focus on making small grains more cost effective, especially with barley conversions to ethanol. You may also want to discuss research into making cellulosic-based ethanol a reality. With cellulosic technology, wheat and barley producers and some grass producers in Montana would have an additional revenue stream for their straw by turning these by-products into ethanol through cellulosic technology. This same kind of technology can be utilized to convert forest by-products (as a result of forest thinning or cleaning as part of the Healthy Forest Initiative) into ethanol as well. Historically there has been great interest in ethanol plants in Montana. We just need technology to create an alternate competitive market.

Biodiesel, on the other hand looks to be financially promising immediately. We would like to see new energy measures include an extender of biodiesel incentives and perhaps a mandate for biodiesel production incentives.

An August 2002 report prepared by USDA's Office of Energy Policy and New Uses working with the Economic Research Service estimated biodiesel demand to increase from its 2002 level of 13 million gallons to at least 124 million gallons a year. Based on the USDA baseline estimates for future soybean production, over a five-year time period the biodiesel tax incentive could add almost \$1 billion directly to the bottom line of U.S. farm income.

The huge benefits from biodiesel are many. It is a home-grown fuel that reduces our dependence on foreign oil and contributes to our national energy security. It is a clean burning fuel that reduces unburned hydrocarbons, carbon monoxide and particulate matter to help clean our air. It provides a new and expanding market for soybeans, sunflowers, canola, camelina and other agricultural feed stocks that increase earnings for farmers and pumps money into rural economies. Opening new markets for agricultural commodities through affordable farm-based ethanol and biodiesel will lower our dependence on foreign sources for our energy needs.

Camelina, a crop I grow on my farm has proven to be a great oil seed to produce biodiesel and in addition has been shown to have huge potential as an animal feed source. The animal feed by-product from camelina is showing higher amounts of Omega 3 oils in all testing. Omega 3 oils are considered a healthy part of your human diet. Examples of the research currently going on include the following:

- Trout feed—Research done at MSU in Bozeman, Montana
- Chicken Feed—in Georgia—Higher Omega's in the eggs
- Dairy Goat feed in Montana—Higher Omega's in milk and cheese
- Beef Cows in Havre—results not known yet.

The feed is 40 percent protein and 10 percent meal and is thought to be about 95 percent digestible.

Another American Farm Bureau Federation Policy that enhances this need for dependence upon foreign energy sources reads as follows:

*Energy, #133*

The United States should be focused on energy independence. We support the Energy Policy of 2005 and the incentives it provides for the production of traditional and renewable energy sources. However, further action is needed to address the vulnerabilities of the U.S. energy sector and the resulting impacts on our Nation's farmers and ranchers. We support funding for the Renewable Energy System & En-

ergy Efficiency Improvement Program. We endorse the 25' × 25' vision of the Agriculture's Role in Ensuring U.S. Energy Security which reads: "Agriculture will provide 25 percent of the total energy consumed in the United States by 2025 while continuing to produce abundant, safe and affordable food and fiber."

Energy independence should be of paramount importance to all lawmakers of the United States. Montana Farm Bureau Federation is pleased to see the following as the target of the USDA, National Renewable Energy Conference as taken from an August 10, 2006 USDA press release: "Advancing Renewable Energy is designed to help create and strengthen partnerships and strategies necessary to accelerate commercialization of renewable energy industries and distribution systems, the crux of President Bush's Advanced Energy Initiative. Leaders from government and industry will address renewable energy topics such as Building Supply and Distribution, Encouraging Demand, Adapting and Building Infrastructure and Creating Effective Market Models and Partnerships."

Strengthening partnerships, and strategies will accelerate commercialization through the actions described and is going to be the key to successfully meshing historical fuel sources and their uses, sales, and market share with successfully marketing renewable fuels. This is where the rubber meets the road, creating these opportunities is vital, so that fossil fuel companies looking at losing market share have incentives to participate in truly marketing renewable fuels.

In conclusion, four outcomes that Montana Farm Bureau would like to see for the future of renewable fuels are:

- There are two incentives currently given for the blenders at the rendering plant for biodiesel; 1. \$0.50 for straight blending and \$1.00 for blending virgin oils.
- 2. An additional 10 cents a gallon given to small producers which would be "on the farm using biodiesel for their own use." These incentives are set to sunset in 2008. We want these to be extended at least through 2011.
- Fuel and fertilizer costs have increased by 24–26 percent in the last year alone. Addressing how to help keep energy input cost consistent and workable should be of paramount importance in the upcoming Farm Bill.
- Investing in research and industry infrastructure will be imperative so that when incentives to grow crops are given, there is an established market to sell them.
- Setting loan rates for alternative crops is essential for growing oil seed crops. Agriculture is the renewable fuel source. Renewable fuels are not new, however continuing innovations have found more efficient production methods and have minimized adverse consequences of using them world wide.

With renewable fuels, it's a win/win situation, for U.S. agriculture and U.S. citizens. Thank you.

Senator BURNS. Thank you, Mr. Willis.

I'm going to start with Dan Downs here, and Dan has been pretty much involved in getting some biodiesel and biofuels established in the State.

If there is one outstanding hurdle that is standing out there in front of us right now for a greater use of the biofuels, in your estimation, where is it?

Mr. DOWNS. Make that two parts. When you first started to ask that question, the first thing that came to my mind is, our goal is to make sure like Peaks and Prairies is we keep it owned by producers. That has been a major problem for us. We can get all kinds of money to build these plants, but the problem is, how do we keep them owned by Montanans.

The second biggest hurdle, I would imagine, will be transportation. I know you, Senator, work for us on all the time on that. If we do get these plants going, like we all—and that was great, I wrote in my notes here, it's wonderful, we're all sitting here in all these groups, and we all agree. You know, we all agree we need to do this; but if we get this thing going we're going to eventually use up—or get to the point where we're going to have no more demand in Montana, we're going to have that full, we're going to have to start exporting it. Well, what are we going to do? And I think transportation issues are going to be a big thing at that time.

Senator BURNS. Now, you mentioned that you think that financing is available?

Mr. DOWNS. When we have been at the different bio meetings, you will see a particular group or investment organization that's more than willing to come in and give you a bunch of money, but it amounts to the same thing we have now. Then we're growing crops for Exxon, you know, is my comparison. We're not growing for a cooperative; we're not growing for Sidney, Montana; we're growing for an investment group somewhere. So our big effort goal in our venture here to get in co-op started is to have it owned by producers, or at least 51 percent. If we set up our bylaws, we want it owned 51 percent by producers. And that—the money's there, but it's just not coming from the right people; and that's why I appreciate your efforts, you know, through loans and grant, that that will give us an opportunity to own our own plants.

Senator BURNS. Anybody else want to comment on that? Mr. Willis.

Mr. WILLIS. Well, I know as a producer, my banker's been fairly good to work with; but one thing I'm seeing other producers that have had hesitancy to approach these alternative crops is there's no world rate for it, there's LDP for it, there's no direct payment for it. So that leaves them exposed on a drought year. If they had wheat instead, they would have their payment for it, their LDP for it, or their crop insurance for it.

We grew almost 80 acres of camelina this year, and it turned out very well for us; but that's all we want to risk this first year. The second year is just to make sure we know how to grow it is. So from a grower perspective we need, as I said earlier, if we can have this included in the farm bill, at least the loan rate where people were guaranteed some income off it, if it takes some of the risk out of it.

Senator BURNS. Mr. Stoner, do you want to comment on that?

Mr. STONER. Somewhat on the lines of that. Crop insurance, I think having a viable crop insurance for the alternative crops, because right now I think we're stuck where really there's not a lot of protection.

Capital has been a hard thing for us to come up with. I guess we haven't been talking to the right people, because nobody's really throwing money at us. We started this little project as a pilot project, and we thought we could get this little crusher facility going, prove that we can produce quality products, and then try to expand this thing; and so we haven't been really out trying to recruit a lot of investment capital because we have been doing it out of our pockets, that are getting pretty small right now, but we have gotten some pretty good some grants, too, from the Government. That helped us out quite a bit.

Senator BURNS. Mr. Kallevig, financing?

Mr. KALLEVIG. You know, there's some Government guarantee programs out there through the USDA Rural Development, and through SBA. Some of those programs are somewhat limited in their size for some of these projects, so it's a little difficult. So grant monies and some new guaranteed promise would really help out to finance the industry to take a look at some of these projects.

You know, the risk is there for any business and any industry, and we try to identify those risks; and there's so many things that—I am the producer and the owners of these projects can do the greatest job in the world producing and making the final product, but there's so many things that are out of their control. Commodity prices are out of their control; if the tax incentives get taken away, that's out of their control; and you know, I did a little bit of research and I think that some of these things can be produced so much cheaper in the foreign countries, and that's out of their control if that import comes in from out of the country for some of this stuff.

So, those risks have to be identified and dealt with so that the bank and the producer and the project owners can take a look at their projections and identify the risks, to help us make our decision if we can finance it.

Senator BURNS. Mr. Bergman, I was really surprised and struck by your comments on your production of oil seeds in this part of the country. It is bigger than I thought it was, the potential of production.

Dr. BERGMAN. Yes. Because of the high oil content we can grow safflowers sunflowers, flax, canola, and camelina, and actually produce more oil per acre than soybeans in the soybean areas. So we have a lot of potential.

I'd like to add, one of the problems with the minor oil seeds is getting the herbicides and fungicides registered on these minor oil feed crops so the farmers can use them.

Senator BURNS. Give me a for instance with regard to that.

Dr. BERGMAN. Well, we requested registration of Harmony GT on safflower as opposed to emergence herbicides to control broad leaf, and I think that was submitted over 6 years ago.

Senator BURNS. Now, give me an idea, can you oil crop every year, or does it have to be rotated?

Dr. BERGMAN. The recommendation is to grow it every third year, because otherwise you'll have problems with pests that build up with oil seed crops; but a one-third acreage on dry land right in our area, we could grow 2 or 3 million acres of oil seed crops.

Senator BURNS. Now, even though you might produce more oil per acre, tell me about your production costs as compared to soybeans in the mid west.

Dr. BERGMAN. You know, I think we would be competitive on production costs. The problem that we have is the market of these products.

Senator BURNS. Does transportation enter into that?

Dr. BERGMAN. Yes.

Senator BURNS. Big time?

Dr. BERGMAN. Yes.

Senator BURNS. Okay. All right. That's pretty interesting. And also, we will be rewriting the farm bill in 2007. We want a stronger energy title. And I appreciate your written testimony. I read some of it last night; but we don't want to sacrifice other programs for this, either, because we still are in the business of providing food stocks for humans and for the livelihood of our ranches. What we're looking for now is the production of that extra nickel.

And Dan Downs brought up a good point. How do we get those dollars? When we look at agriculture at the production level, years and years and years, in my life anyway, we've always had the—I guess you'd have to call it the value of the consumer dollar—we always got 15, to 16, 17 and 18 cents back to the farm. Now we're below a dime, and that's what's really hurting us more than anything else.

So Dan brings up a good point. How do we get our share of that consumer dollar back to our producers? Is it through co-ops? Is it through whatever? But now we're starting in on a new adventure where agriculture will become a part of the energy mix. That we can do it right and still get those dollars back on the farm to the producers, because right now if it's anything it's hurting us right now is our cost of production on the farm that's killing us, and these energy prices are just devastating. So I think as we look at that, we'll have to do a lot of research on that, too, on how do we hold those dollars back on the farm.

Any comments on that?

Mr. DOWNS. Do I have a minute left?

Senator BURNS. Yes.

Mr. DOWNS. I wanted to mention something. Everybody brings up such great points on this; and when we go to these meetings, they are talking that, you know, we're going to take the food from the baby. Well, we're not. And the point was just made of—you know, we're looking on my place, I'm dry land, south central Montana, we go crop, fallow, crop, fallow, crop, fallow. With these crops here that we're looking at now, we're looking at, for example I'll just say camelina, wheat, fallow.

Well, that's just added a third not only to my income, but that's put some tax base back in Montana, too; and that first year when I'm raising that camelina, it's not going to waste, I'm raising feed stocks for cattle, you know. That takes pressure off of other issues like bringing corn into the State. Instead of bringing corn into the State, or a high protein meal, we're doing it right here in Montana. So again, that leaves more money in Montana. And I think that's one thing that we really, really got to look at.

And the high omega-3 thing, that's going to be a big deal. And we got that million dollar grant where we give that money out. I'm on that board, and boy these guys are doing great research with the fish and the chicken and the beef; and if it comes the way I'm hoping it's going to come, we're looking at Montana—and Montana is a great name in beef—or Montana is a great name in anything when you go to sell an ag product. But if we could sell Montana beef, high in omega-3, east coast, west coast, we just put \$.50 a pound on them. And again, if we have the feed stock here, we could even be butchering here, and that's a big deal for Montana.

Senator BURNS. Yes, sir, Mr. Willis.

Mr. WILLIS. You talk about finding ways to get the money back into the producers pockets. I think the first step, and it would only be the first step, would be let's set some goals from what's being heard from the panel of the producers growing fuel. We're trying to figure out how to calculate how many acres I need on my farm to grow enough fuel to run my tractors and my truck, and I think we're under 10 percent right now—I think it's actually lower than

that—but some people that have minimum till, it will be lower than that; but I think the first step would be how can we just replace our own fuel. At least that would cut on your costs. Then as we get going and start developing these other plans, then we can start shipping it to other people or producers. But I think the first step would be how can we, just on our own acreage, take out 5 percent of our acres and grow our own fuel; and that would put the money to the bottom line directly.

Senator BURNS. Okay. Anybody else have any ideas?

Anybody want to express anything else?

You've answered most my questions. The renewables—wait a minute, I did write something here. I've got a fantastic memory, but it's short. No, we've already answered that. Okay. Thank you very much. Appreciate your testimony. Your full testimony will be part of the record. We appreciate you making the effort to get over here today and to testify on this. This will be a topic when we start looking at agricultural appropriations and where we take those dollars, and the emphasis to be placed on those dollars. And that's the purpose of this. Thank you very much, and we appreciate you coming.

We will get ready for the second panel, if we can.

Dr. BERGMAN. Senator Burns, can I introduce someone? We have a privileged person here that's an adviser to the National Biodiesel Board, Leland Thom. Leland, if you will stand up. He lives in Williston, North Dakota.

Senator BURNS. We'll not hold that against him.

Dr. BERGMAN. Leland knows a lot about biodiesel, if anybody wants to visit with him after the hearing.

Senator BURNS. Leland, thank you for coming today. We appreciate that very much. We appreciate your good work, too.

All right, we have Mr. Thomas Dorr, Under Secretary for Rural Development, and Dr. John Ashworth, National Renewable Energy Laboratory, Department of Energy down in Colorado; and we want to thank these two gentlemen for coming this morning, and to hear their perspective on renewables and alternative fuels; and I want to thank you for making the trip up here. I really do.

By the way, Dr. Ashworth, Senator Domenici will be in the State next week and will be talking Milk River and irrigation and all that, and I know you're familiar with the chairman of the Energy Committee.

Mr. ASHWORTH. Yes, I am.

Senator BURNS. And in your work. And we would be Secretary Dorr, and look forward to your comments.

#### **STATEMENT OF THOMAS C. DORR, UNDER SECRETARY FOR RURAL DEVELOPMENT, DEPARTMENT OF AGRICULTURE**

Mr. DORR. Thank you. Thank you, Senator. Thank you to the committee for holding this hearing. It is a distinct pleasure for me to be here today to discuss renewable fuels and the agricultural economy. Let me add, it's great to be doing this in Montana. I might also add that I am a farmer from Iowa, from northwest Iowa, on temporary assignment in Washington, so it's great to be back in rural America.

Historically, ethanol has meant corn, and biodiesel has meant mostly soybeans, as was discussed here a few minutes ago. These have been regional industries and the corn/soybean complex, obviously, isn't Montana's long suit; but the recipes are in fact changing, as we're hearing today.

What is so exciting, though, is that biofuels are breaking out of the old boxes. The potential is to move from a regional industry based in the corn belt, currently supplying about 3 percent of our gasoline usage, to a national industry providing hopefully as much as 30 percent of our transportation fuel needs by 2030, and that is a big deal. That prospect, however, isn't automatic; it's not certain. It's going to take a lot of hard work, and frankly, it's going to take some risk taking by investors to get there. A lot depends on the ability of researchers to make cellulosic ethanol cost competitive, which is President Bush's goal in the Advanced Energy Initiative.

Well, that also depends on the price of oil 5, 10 and 20 years down the road. Prices fluctuate, markets correct, and investors need to do their due diligence.

That said, however, we are working hard to accelerate the transition to renewable fuels; and when this happens, Montana and other States of the northern plains have a very substantial resource base.

At USDA Rural Development, we look forward to partnering with you to build upon these emerging opportunities. Dr. Bergman, who testified just a few minutes ago, is one of the top experts on the resource potential in Montana and North Dakota. And I would like to thank him personally for the information that he made available to my staff on some of these questions. But in particular, I was fascinated to learn that Montana safflower is potentially more productive for biodiesel on a per acre basis than Iowa soybeans. I spent most of my life farming outside Markus, Iowa, and I know something about soybeans, and I know that the potential Dr. Bergman describes is, in fact, quite significant.

Similarly, production of cellulosic ethanol opens the door to a wide range of new feed stocks, including wheat straw, switchgrass, corn stover, and other new resource streams, again many of which were mentioned by Dr. Bergman earlier. But Montana's resource base is significant with more than 4 million highly productive acres potential. This 4 million acres potentially employed for renewables. The challenge before us, though, is how to capitalize and accelerate the development of ethanol biodiesel and indeed other renewable fuels. This is a core commitment for President Bush, and has been since he took office in 2001.

The President, in my view, has been far out in front on this. USDA, the Department of Energy, and private labs are working hard to make cellulosic ethanol cost competitive. The Bush administration has extended the ethanol tax credit; they have created a new small refiners credit, and created the first ever Federal incentives for biodiesel production. The rapid expansion of the ethanol and biodiesel industries is a direct result of these.

At USDA Rural Development, we are an investment bank, if you may, for rural America. Believe it or not, we currently have a portfolio in excess of \$93 billion in investments in rural business, infrastructure, housing, and community facilities. We directly support

renewable energy development through 10 separate programs in our business and utilities mission areas. In fact, we have made, collectively not just in renewable energy, but over \$100 million a year—between \$80 and \$100 million a year in investments in the State of Montana alone, every year for the last 5 years.

From fiscal year 2001 and fiscal year 2005, the first 5 years of this administration, we have invested nearly \$370 million, in excess of 650 renewable energy and energy efficiency projects, and this continues to be the top priority going forward. We are not slowing up.

The bottom line, Mr. Chairman, is that renewable energy represents an historic new opportunity for investment and wealth creation in rural America. We're eager to support this investment in this area, and I'm encouraged by the level of interest that we're seeing in Montana, throughout the Northern Plains, and I applaud the subcommittee, particularly you, Senator Burns, for your leadership on this issue.

So on behalf of President Bush, Secretary Joe, the great team here in Montana, USDA, let me say we look forward to working with you as we go on. Thank you.

[The statement follows:]

PREPARED STATEMENT OF THOMAS C. DORR

Mr. Chairman, it is a distinct pleasure for me to appear today to discuss renewable fuels and the agricultural economy. The potential may be summarized in three words: positive, significant, and imminent. It is also important to note that there is also risk. Prices fluctuate, markets correct, and due diligence is required. A great deal depends on the price of oil 5 and 10 and 20 years down the road. That said, however, renewable fuels are an enormous opportunity, both for rural America and for the Nation. They are also a high priority for the Administration. I thank the Subcommittee for this opportunity to discuss our activities in this area.

USDA Rural Development's mission is to increase economic opportunities and improve the quality of life in rural communities. We administer over 40 grant, loan, and loan guarantee programs providing funding for rural housing, infrastructure, community facilities, and business development. In the first 5 years of the Bush Administration, we have invested over \$72 billion. Our current loan portfolio exceeds \$93 billion.

Renewable energy is a relatively new but increasingly important part of this portfolio. USDA's commitment to renewables is twofold. First and most importantly is strengthening America's energy security. America suffers—in President Bush's phrase—from an increasingly expensive addiction to oil. This dependency imposes heavy national and economic security costs. Reducing this vulnerability is a high priority.

From the President's initial energy policy initiatives in 2001 . . . through the energy provisions of the 2002 Farm Bill, the American Jobs Creation Act of 2004, and the Energy Policy Act of 2005 . . . to the Advanced Energy Initiative announced in January 2006, President Bush has advocated a wide range of initiatives to strengthen America's energy security. The recent sharp increase in world oil prices underscores the urgency of this effort.

Secondly, from USDA's viewpoint, renewable energy offers an opportunity for investment and wealth creation in rural America. Ethanol and biodiesel rely on agricultural feedstocks. Anaerobic digesters are livestock dependent. Due to siting issues, many wind farms and solar arrays will be deployed in rural areas. These and other rural energy sources are becoming increasingly cost competitive.

USDA Rural Development's role in this area is to stimulate economic growth in rural communities. From fiscal year 2001 through fiscal year 2005, through the first 5 years of the Bush Administration, we have invested over \$356 million in 650 renewable energy and energy efficiency projects encompassing a wide range of technologies. These investments have leveraged an additional \$1.3 billion in private capital. This has been an agency-wide effort; 10 separate USDA Rural Development programs have contributed to these results.

In addition to the Rural Development mission area, the Forest Service, the Cooperative State Research, Education, and Extension Service (CSREES), the Agricultural Research Service (ARS), the Natural Resources Conservation Service (NRCS), and the Farm Service Agency (FSA) are also involved in renewable energy initiatives as well. On a closely related front, USDA's Office of Energy Policy and New Uses administers the Federal Biobased Preferred Products Procurement Program (FB4P), the USDA Certified Biobased Product Labeling Program, and the Biodiesel Education Program (BEP).

Across all mission areas, USDA outlays in fiscal year 2006 on biobased products, bioenergy and other energy-related programs are estimated at \$272 million. DOE's fiscal year 2007 request for its Office of Energy Efficiency and Renewable Energy, which supports related research development, demonstration, and deployment, is \$1,176 million; funding at DOE's Office of Science and at other agencies (DOD, NASA, NSF) adds significantly to this figure. In addition, there are Federal and State income tax credits and other tax incentives that promote the use of ethanol and biodiesel.

In short, renewable energy remains a core strategic commitment for the Bush Administration, and I want to acknowledge and thank the members of this Subcommittee for the support of the Congress for these initiatives.

As noted above, our renewable energy investments involve a wide range of technologies. Today's hearing is focused on two of these—cellulosic ethanol and biodiesel—with significant potential for agricultural producers in Montana and other States in the Northern Plains. The Northern Plains have not traditionally been considered biofuels country. That may change if cellulosic ethanol can be produced cost effectively.

Traditional ethanol production in the United States has been corn based. This is a great thing for the corn belt. U.S. ethanol production last year soared to 3.9 billion gallons, up from about 900,000 gallons as recently as 2000. That is more than a four-fold increase in 5 years. One hundred and one ethanol plants are now in operation; 7 of these are being expanded, and another 39 plants are under construction. Annual ethanol production is now equivalent to about 3 percent of the Nation's gasoline consumption and is expected this year to absorb 20 percent of the corn harvest. Corn-based ethanol, however, is ultimately limited by the acreage suitable for corn production and eventually, the market's ethanol capacity. It is also an inherently regional resource.

Cellulosic ethanol, however, escapes these constraints. Potential cellulosic feedstocks include switchgrass, wheat straw, corn stover, algae, woody biomass including forest byproducts, recycled wood and paper materials, and municipal waste. Reducing the costs and improving the conversion efficiencies of cellulosic production continues to be a high priority for research for USDA, the Department of Energy, and academic and industrial laboratories. Steady progress is being made in a number of pilot plants currently in operation. The next step is an industrial-scale demonstration, which DOE plans to begin funding in fiscal year 2007 if Congress provides the President's request. If the economics are favorable and scale-up issues are addressed, cellulosic ethanol plants may be eligible for a loan guarantee under a new program authorized to DOE by the Energy Policy Act of 2005.

The potential biomass resource that could be used for cellulosic ethanol production appears to be large. A scoping study conducted by the Department of Energy and USDA (*Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion Ton Annual Supply*), found that U.S. farm and forest lands, on a sustainable basis, can supply enough feedstock to displace 30 percent of current U.S. petroleum consumption with biofuels by 2030, while still meeting the Nation's food, feed, and export demands. The Big Ton Study has generated a lot of discussion about the amount of feedstock available, but not about the direction of the analysis. The potential resource is large. There clearly is potential for biofuels to displace a significant amount of oil-based transportation fuels.

Montana and other Northern Plains States share in this potential. The 16 counties of the Eastern Plains RC&D area, for example, have more than 4.3 million acres of cropland and 760,000 acres of hayland could be suitable for the production of bioenergy crops. Markets will determine whether, in the long run, cellulosic ethanol production will be based on dedicated crops such as switchgrass or on waste streams such as wheat straw, but in either case the regional resource base is significant.

The Northern Plains also enjoy a major biodiesel potential. Biodiesel production in the United States last year reached 91 million gallons, up from just 2 million gallons as recently as 2000. The rate of increase is extraordinary and can largely be attributed to tax incentives and subsidies as well as rising oil prices. The number

of biodiesel plants has increased from 10 in 2000 to 65 today, with another 58 under construction.

This dramatic growth results from a classic push-pull combination: soaring oil prices coupled with the production incentives provided in the American Jobs Creation Act of 2004 and the Energy Policy Act of 2005. It is also a classic case of "back to the future," as Rudolf Diesel himself ran some of his earliest engines on peanut oil.

To date, U.S. biodiesel production has been based primarily on soybeans and secondarily on animal fats and recycled cooking oil and grease. As the industry matures, however, a wide range of oilseeds may be employed including rapeseed, sunflower, safflower, and flax as well as soybeans. As with cellulosic ethanol, therefore, the Northern Plains have the potential to contribute significantly to the buildup of the biodiesel industry.

There is some exciting work being done right here at the EARC (Eastern Agricultural Research Center) on this subject. In the Eastern Plains RC&D area, for example, there are 4.3 million acres of cropland suitable for growing oilseed crops in a 3 year crop rotation basis with wheat and annual legumes. Research here at EARC has already demonstrated that, on a per acre basis, safflower production in eastern Montana can produce more oil per acre than soybean cultivation in the soybean producing States. While results will differ somewhat in other regions and for other oilseed crops, this is obviously a very significant resource. I want to thank Dr. Jerry Bergman for bringing this analysis to my attention.

In conclusion, the cellulosic ethanol and biodiesel potential is very large, and the Northern Plains have the potential to competitively produce these products as technologies and industries develop and mature. Biodiesel production is already increasing rapidly, while the goal is for the President's Biofuels Initiative at DOE is for cellulosic ethanol to be cost competitive by 2012. We understand that at least two private companies will soon announce plans to build commercial scale cellulosic ethanol demonstration plants.

We are eager to accelerate this evolution and look forward to supporting it across the full range of USDA agencies appropriate with each agency's mission. We will coordinate closely with DOE, the lead for the President's Biofuels Initiative. This is an extraordinary opportunity for investment and ownership in rural America—for a new value-added product stream for producers—for new jobs and tax base in rural communities. We welcome the interest and support of the Subcommittee and of the Congress as well. Thank you.

Senator BURNS. Thank you, Mr. Secretary. I appreciate that. That's over \$90 billion. It gets my attention a little bit.

Mr. DORR. Million, not billion. \$92 billion in investments; between \$80 and \$100 million a year in Montana.

Senator BURNS. That's right. I read the testimony of Dr. Ashworth last night, and I think his testimony this morning, and there will probably be some questions that come from it; but we welcome him this morning. He's a team leader in partnership development, the National Bioenergy Center coming out of Golden, Colorado; and Dr. Ashworth, thank you for coming up this morning.

**STATEMENT OF DR. JOHN ASHWORTH, NATIONAL BIOENERGY CENTER, NATIONAL RENEWABLE ENERGY LABORATORY, DEPARTMENT OF ENERGY**

Dr. ASHWORTH. Mr. Chairman, thank you for the opportunity to come and address this audience; and hopefully we can talk a little bit and I can answer questions that people may have about how we can take—we can produce not only abundant energy, but as this technology begins to spool up, we will create value added economic activity and high paying jobs in rural America, and reduce dependence on foreign oil at the same time.

So, I am a team leader for partnership development for the National Bioenergy Center of the National Renewable Energy Lab—that's a big mouth full—in Golden, Colorado. We're the prime lab-

oratory for the technology development and for the technology helping industry to commercialize the technology for both renewable energy and energy efficient technology; so we kind of cover the ground, but I'm going to talk about biomass today.

The committee, I'd say, is commended for bringing up the topic of the potential of biofuels, and I'm going to focus on cellulosic ethanol today, and other people have already talked quite a bit about biodiesel; but I want to say that really, if we try to look at the issue of dependence on imported oil, we really have a limited number of technologies we can work with, because biomass is really your only option if you want to make transportation fuels.

If you want to make electricity, we've got wind and other options, but biomass is really what we have to work with if you want to make liquid transportation fuels that are renewable and sustainable over a long period of time.

The thing I think that surprises a lot of people, and particularly people in Washington, is how large the biomass resource base is in the United States. We've always asked that question, how big is it? So, about a year and a half ago USDA and Oak Ridge National Laboratory basically sat down and did an inventory of all the biomass resource base in the United States; and they found that there's about 1.3 billion tons of biomass that can be harvested on a sustainable basis. That means that the soil is not going to be degraded; you're not going to have wind erosion; you're going to keep the resource base at the same level or better every year.

Well, that's an abstract number. What does 1.3 billion tons mean? And when we talk to people in industry, they think, in terms of oil, because oil is in fact what we run our society on today. It's about the equivalent of 3.5 billion barrels of oil a year. Well, how much oil do we use in the United States? This is equivalent to about 60 percent of all the oil we use in the United States today.

So we could displace 60 percent of all our oil use, or more like 75 or 80 percent of our imported oil on this existing biomass resource base. Will we be able to do all that immediately? No. But do we have the technology and the capability to understand how to convert this resource base? Yes, we do. It's going to be an issue of economics.

So the—I'm really going to talk just kind of briefly about biodiesel, because it's not something that NREL really works on. We don't work on biodiesel because it's a commercial technology, there's people out building things all over the United States. What I can tell you is it's growing very rapidly. Biodiesel, just last year, was 75 million gallons a year of production. This year it's going to be 300 million gallons. Next we are—we don't know how much, but it's probably going to be double that. Biodiesel is growing very rapidly in the United States.

The issue really is in biodiesel, the resource base is relatively small. It's not insignificant, but it's relatively small. We think that biodiesel could probably produce 5 percent of the diesel fuel produced in the—used in United States pretty readily. Above that, it's going to be a challenge, and you're going to maybe have to find new sources that we were talking about, the panel was talking about today, new fuels, new feed stocks in order to get that much over 5 percent.

I'm going to switch and talk a little bit about ethanol. The United States produces about 4 billion gallons a year of ethanol right now, most of it based on corn. There's a little bit produced on milo and some other crops, but primarily produced on corn; and that industry is growing very rapidly. There's 34 plants under construction in the United States right now.

Mr. DORR. 37.

Dr. ASHWORTH. Okay, three have been added since yesterday. We expect corn based ethanol to probably hit about 8 billion gallons a year in the next couple years. It's more today; we expect it will probably reach about 8 billion; and my best back of the envelope calculation is that it can probably provide about 10 percent of the gasoline pool in the United States. This is also a number coming out of the National Corn Growers Association. So that's about 15 billion gallons. That's a lot of ethanol.

But if you want to go beyond that, you really have to look at lower cost feed stocks, or other grains; but even if we include all the small grains, it's still not going to add a lot of capacity. So we're really looking at other resources; and two that I'd like to kind of raise to you today that we see as being very abundant and having potential, are corn stover, which is the one that people kind of talk about, and wheat straw. Now, this is the non food part of the corn plant or the wheat plant, including stalks, the leaves, the husks.

And then there's other resources that people are only just beginning to look at that are very abundant in Montana and the United States. This is forest thinnings—as we try the take fire road off the national forests, and also the residues from the forest industry, the residues from agricultural operations, and eventually we will probably move to energy crops. By this we mean fast growing trees, like hybrid poplar, or fast growing grasses like switchgrasses that several people here have mentioned.

DOE's developing a multi-year program right now to try and get to the point where we can produce about 60 billion gallons of ethanol, or other bio-based fuels by the year 2030. So, probably 15 times what we're doing now. It's a pretty ambitious program, but we can see a way to get from here to there; but in order to do that, we've really got to perfect the technology in every step of the process. I know we're researchers, we focus on certain pieces; but we know all the pieces have to be there.

You have to be able to grow the feed stock inexpensively, you have to be able to transport it, you have to be able to convert it, and then you have to be able to use it once it's produced. And this is—in order to turn cellulosic materials into fuel, it has to be cost competitive. So we have to reduce the cost of the technology, and we have to increase the efficiency. It's a two-part process as we go along.

We can also grow the size of the resource base, so the biomass resource base using new crops, new grasses, new trees, we believe will also go up; so bio fuels can become a large fraction of our liquid fuel supply.

With the President's bio fuels initiative that several people have talked about, we now see a pathway to making this a reality. Our goal, our research goal given to us as a national laboratory, is to

make cellulosic ethanol the same cost as corn-based ethanol in the next 6 years. So by the year 2012, we have a target of producing cellulosic ethanol, and producing that technology at \$1.07 a gallon.

Senator BURNS. Do you think that's obtainable?

Dr. ASHWORTH. Yes, we really do. We're looking at it right now as becoming \$2.25 to \$2.50 a gallon right now, in our model. Now, that's at scale. And we don't operate at scale, we're a pilot plant, we operate at a ton a day. But as we scale it up, we see a pathway to get from here to there. We understand the different research steps that have to get from here to there, and we haven't enough resources to do it. We didn't have enough resources to do it, but we do have the funding now to do that.

What we would really like to do is—I'm going to skip some of this thing here—but I think one of the things I did want to point out here is that cellulosic ethanol is an interesting thing because it really will have a large impact on rural America; and the reason is, that if you're going to be taking a—let's take 2,000 tons a day, which is how we expect how large these plants are going to be, you're going to have to collect that feed stock, you're going to have to move it to the factory, you're going to have to process it, and you're going to have to ship the final product. That's going to mean 30 or 50 high paying jobs in that plant for the people who operate that plant; but then more importantly the farmers who are going to provide the feed stock, or in the forestry parts of this country the foresters are going to provide that feed stock, somebody's going to transport that biomass, and somebody's going to transport the finished product away from the factory. These are all going to have a direct impact on the rural facilities.

The number that—people ask me the question what does this mean? A 70 million gallon a year plant is going to put about \$100 million a year into the local economy in terms of the output, the tax base, the production and the sale of that material. And we envision that in order to hit the President's goal is going to be several hundred of these plants in operation by the year 2030. So you can just kind of do the math and see the implications of that.

The other kind of the last thing I'd like to say—I'm just going to summarize because I can see in people's eyes there's some questions out there, so I'm going to cut this a little short—I'm going to just kind of summarize one thing.

Number one, biomass is really your only renewable resource of transportation fuel. If you want to make transportation fuels on a sustainable basis, biomass is it.

Number two, we have a large resource base. We are not resource base constrained in this country.

Number three, the energy balance, when people ask me this question, is actually quite today. It's not going to take more energy to do this than it is to do in the embodied product. It's going to come from all over the country, so we're going to see an industry that's going to be regional. It's not just going to be based on corn; it's going to be based on wood, and wheat straw, and it could be based on camelina. Whatever it is, it's going to be a very regional business.

And lastly, we're finding ways to increase efficiency and lower the cost. We just need to get it to the point where private industry will take it over and run with it.

My job is the putting together partnerships between private industry and our laboratories, so I work with industry all the time. That's my job. And I can guarantee you that the money that's being spent right now by the government, and by DOE, and USDA, has a commensurate investment by the private sector right now. They are very heavily investing into this technology, because they are looking for the path in order to make money in this; and I do think in the very near term, probably 2010, 2011, the first cellulosic ethanol plants will be up and running in this country; and then the question then is, where do we go from there to make it a large scale industry.

[The statement follows:]

PREPARED STATEMENT OF DR. JOHN ASHWORTH

Mr. Chairman, thank you for this opportunity to discuss how biofuels can provide our Nation with an abundant, renewable source of energy; provide the rural areas of country with new value-added economic activity and high paying jobs; and in particular, help reduce our dependence on imported oil. I am the leader of the partnership development effort for the National Bioenergy Center at the National Renewable Energy Laboratory in Golden, Colorado. NREL is the U.S. Department of Energy's primary laboratory for research and development of renewable energy and energy efficiency technologies. I am honored to be here, and to speak with you today.

The committee is to be commended for considering the issues related to renewable energy, and the important role to be played by cellulosic ethanol and biodiesel. Researchers at NREL are dedicated to helping our Nation develop a full portfolio of renewable energy technologies to meet our energy needs. Given the seriousness of the energy challenges we face as a Nation, there is a lengthy list of renewable and conventional energy options that must be pursued. If we narrow our focus, however, and consider specifically just those things we can do to create a viable alternative to oil—then our choices become more limited. Developing an industry to maximize the production of biofuels like ethanol, biodiesel, and other biofuels must be a priority—because biomass is the only renewable option we have for liquid transportation fuels.

*The Emerging Biofuels Industry*

Biomass is plant material—most commonly trees, grasses or agricultural wastes—that can be turned into energy. There are a lot of ways biomass can provide energy, and for decades there has been a valuable biopower industry in this country that produces electricity from biomass. Your hearing on the future potential of biofuels is timely and appropriate. We only recently have come to fully comprehend just how valuable a contribution biofuels can make, and how we can mobilize the technology and the entrepreneurial wherewithal to make it happen.

When President Bush came to our laboratory earlier this year, he talked about a national goal of replacing more than 75 percent of our oil imports from the Middle East by 2025. And he affirmed that the best way to do that is through increasing our research on advanced energy technologies.

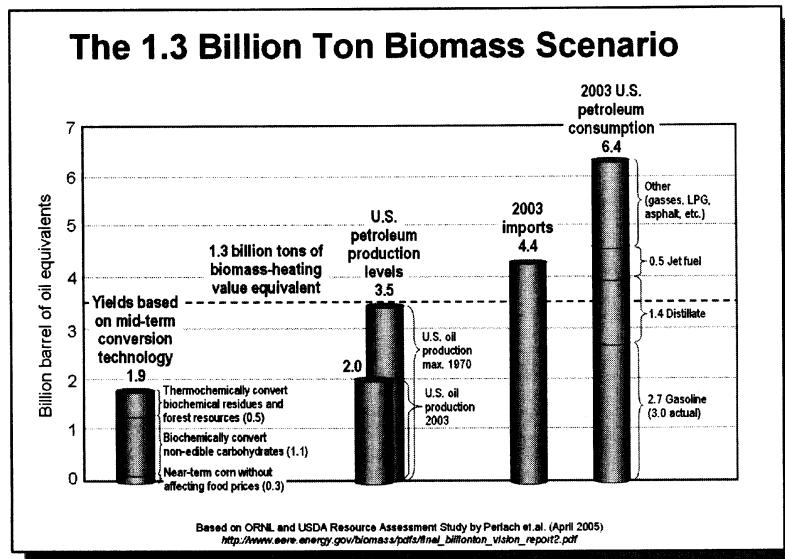
I strongly believe that the 7.5 billion gallon goals set forth in the Renewable Fuel Standard are not only achievable, but that they represent a minimum of what is needed. Accelerated development of cellulosic ethanol and biodiesel industries is a goal that I believe is required and can realistically be accomplished—if we put adequate resources behind the effort. And, accelerating the adoption of E-85 is critical to displacing a large fraction of petroleum with ethanol.

Our goal is to make renewable biomass-derived fuels and chemicals the solution for ending, as President Bush himself memorably put it, our Nation's "addiction" to oil. And with the President's Advanced Energy Initiative, we are on course to bring the Nation's first commercial cellulosic ethanol production facilities into existence by 2012.

### Biomass: A Plentiful Resource

While much remains to be done, we as a Nation start with some significant strength. The biomass resource in the country is huge, and the potential for it to grow is significant.

The Department of Agriculture and the Department of Energy recently looked at the question of whether the Nation's biomass resource could foster a biofuels industry large enough to meet a significant portion of our Nation's future fuel needs. The report, now commonly referred to as "The Billion Ton Study," for the first time confirmed that the United States could yield more than a billion tons of biomass annually for energy needs. And, importantly, we could do this without negatively affecting the Nation's ongoing needs for food or fiber. This is significant because the 1.3 billion tons of biomass that was forecasted contains as much energy as 3.5 billion barrels of oil.



Let me provide some perspective on that. These 3.5 billion barrels are about 60 percent of the 6 billion-plus barrels of oil the U.S. consumes each year. Domestically, the United States, including Alaska, currently produces about 2 billion barrels of oil per year. That's only 67 percent of the potential we see from biomass. U.S. oil production peaked in the early 1970s at the same level of production, about 3.5 billion barrels per year. The United States has never produced more than 3.5 billion barrels a year of oil.

It should be emphasized that such a transition to biofuels will not happen overnight. It will take a significant and sustained national effort to get us there. Still, "The Billion Ton Study" clearly demonstrates the biomass resource is real, and large enough to ultimately replace a large fraction of the petroleum-derived fuels we depend on today. DOE is in the midst of developing a vision for replacing 30 percent of current motor gasoline with ethanol by 2030 and this should help guide us in realizing the potential of biofuels.

Moreover, the resource is regionally diverse. We envision that every State in the Nation could produce biomass and could benefit economically from an expanding biofuels industry. Montana, the Pacific Northwest, the Northeast, and the Southeastern United States are rich in woody biomass—forest thinnings, mill wastes, beetle kill trees, and possibly fast growing species such as hybrid poplar. There is also wheat straw and sorghum in Western farmlands with more modest rainfall. The Midwest will contribute corn stover, oat and soy hulls, and a variety of feedstocks.

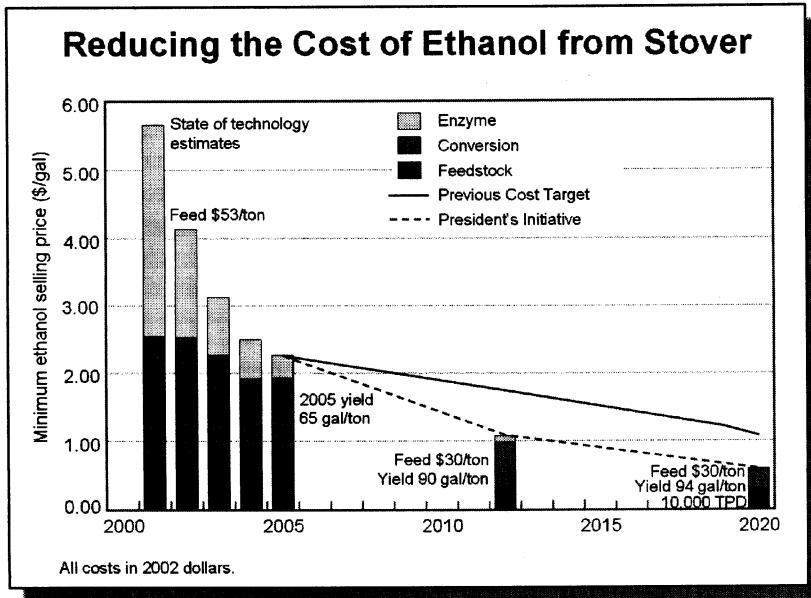
I am going to focus primarily on ethanol and particularly on cellulosic ethanol today. DOE and NREL are not undertaking major research on biodiesel today, other than to work with the National Biodiesel Board and other interested parties on testing biodiesel for purity and to undertake engine tests on biodiesel emissions and power output. Using relatively mature technologies, industry, is continuing to in-

crease biodiesel production, from 120 million gallons in 2005 to an estimated 300 million gallons this year. We do see the vegetable oil and animal fat feedstock base for biodiesel as being much more limited than that for cellulosic ethanol, but expect biodiesel capacity to grow rapidly to meet perhaps 5 percent of U.S. domestic diesel fuel consumption.

We are encouraged by the fact that there already exists a strong and growing ethanol fuels industry in this country. The United States currently produces more than 4 billion gallons a year of ethanol, almost exclusively from corn grain, and the industry is growing very rapidly. We believe that the U.S. ethanol industry will reach 8 billion gallons of installed capacity in the next few years, providing many highpaying jobs for rural America, and helping boost farm income.

To understand where we are today and where we need to go, we need to see ethanol technology issues and biomass resource issues as interrelated. To move the ethanol industry to where we need it to be, we have to move beyond corn grain as the primary biomass resource. One of the most abundant potential resources we have is corn stover, the non-food parts of the corn plant, including the stalks, leaves and husks. Other resources are forest thinnings, hardy grasses like switch grass, and fast growing trees.

To use these and other resources we need to perfect new technologies that convert the cellulosic materials of the plants into fuel.



#### *Breaking Down The Economic Barriers*

So, why aren't we producing ethanol from cellulosic biomass today? Simply put, the cost is too high. If we were to build a facility today for converting cellulosic biomass to ethanol, it would produce ethanol at about twice the price of one of today's existing corn grain ethanol facilities. But we are making steady progress. The focus of the DOE Biomass Program and the National Bioenergy Center is to make cellulosic ethanol as cheap as corn ethanol within the next 6 years. Longer term, DOE and NREL are targeting a cost of cellulosic ethanol as low as 60 cents per gallon, but this will require revolutionary approaches for producing, collecting, and converting biomass.

The targets we have set to accomplish this are ambitious, but we believe they can be met, if adequate research support is available. Our goal is to reduce the cost of producing cellulosic ethanol from \$2.25 a gallon in 2005, to \$1.07 in 2012. To get there we are working to greatly increase production efficiencies, and boost the average yield from 65 gallons per ton as it is today, to 90 gallons per ton in 2012.

One of the reasons I'm optimistic that we will meet these targets is our encouraging progress to date. Over the past 5 years, we've been able to drastically cut the

cost of ethanol from cellulosic biomass, corn stover in particular, by reducing the cost of enzymes through a partnership with two major enzyme manufacturers, and by improving the biomass conversion process.

In the late 1990s, the high cost of cellulase enzymes forced the use of an entirely different biomass conversion process called acid hydrolysis, even though the acid hydrolysis process has inherent limitations in what it can yield. That has changed because of a partnership between DOE and two of the world's largest biotechnology companies—Genencor and Novozymes. The consequences of that research collaboration have been impressive. The cost of enzymes for producing cellulosic ethanol has been reduced more than tenfold. As a result, all major process development work on cellulosic ethanol production is now focused on the more efficient enzymatic hydrolysis process—proof that the nascent industry is already benefiting from these scientific breakthroughs. We continue to work toward further reductions in the cost of these enzymes.

#### *Integration Of Biorefineries Into Existing Industries*

Another exciting area of work is in the development of what are coming to be called "biorefineries". Our scientists at NREL, together with those at other DOE national laboratories, universities and corporations, are leading the development of fully integrated refineries that use biomass, instead of petroleum, to produce fuels, chemicals, synthetic materials—virtually all of the products we use from a conventional oil refinery today. Biorefineries utilize a complex array of processing facilities to break down, convert and recombine a wide range of biomass components into fuels and chemicals, in a manner similar to how petroleum refineries convert petroleum crude oil. We envision that future biorefineries will utilize a wealth of resources we either underutilize or don't use at all today. That includes agricultural residues, forestry residues, dedicated energy crops, municipal solid waste, algae and by-products of the food and grain industry.

A range of biorefinery R&D work is underway in partnership with industry. DOE's biomass program is partnering with a number of the major ethanol technology providers and ethanol producers, including Abengoa, ADM, Broin and Cargill, to increase the yield of ethanol from existing corn ethanol facilities and expand the slate of feedstocks. In many ways, a cellulosic biorefinery can be viewed as an expansion of a corn ethanol facility. That's why we believe tomorrow's cellulosic ethanol industry will not replace today's corn grain ethanol industry, it will evolve from it.

At the same time, DOE is partnering with chemical industry leaders, such as DuPont, to develop new opportunities for producing both fuels and chemicals from biomass. DOE is partnering with the forest products industry to explore and develop biorefinery concepts that can integrate into existing forestry operations. And, most recently, NREL is partnering with oil industry technology developers to explore novel options for integrating biomass streams into existing petroleum refineries. These and other partnerships are speeding the progress of new technologies to the marketplace, and may uncover new options for producing fuels from biomass.

Thermal technologies such as gasification, pyrolysis and hydrothermal systems are all worthy of further research and development to determine how these technologies and the respective biofuel products impact the cost, efficiency and integration into existing fuels infrastructure.

#### *Biorefineries As Drivers For Rural Development*

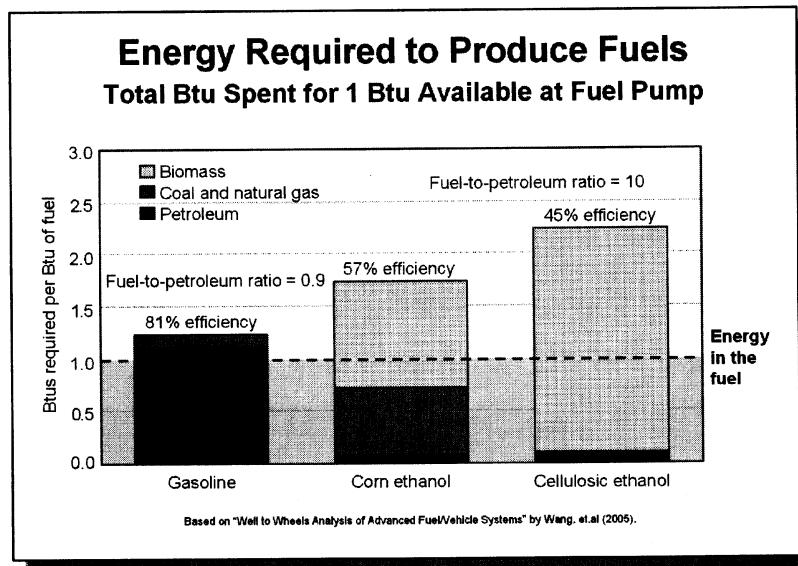
Biomass is difficult and expensive to transport. Therefore, we expect that future biorefineries will be located close to the sources of biomass feedstock, just as corn-based ethanol plants are located in counties with abundant corn supplies. As a general rule of thumb, we expect large commercial biorefineries to draw upon a feedstock supply area with a radius of about 25 miles. So woody biomass-based cellulosic ethanol plants are likely to be located in rural areas with dense stands of timber or existing forest products plants. Each commercial cellulosic ethanol plant is expected to require 2,000 tons per day of feedstock, which will be purchased from local suppliers. The value of those biomass supply contracts alone may be \$20 million–\$30 million per year, for each plant. Trucking the feedstock to the plant can be another thriving local business, just as it is near existing corn ethanol plants today. Each plant can provide 30–50 new, high paying jobs, and there will be additional benefit to the local economy in terms of related job creation, as well as taxes paid to local and county governments.

#### *Ethanol Reduces Use Of Petroleum*

Let me address issues surrounding the energy efficiency of ethanol. The first ethanol plants built in the late 1970s were costly and energy intensive, and that sparked a debate about whether it made good "energy sense" to replace gasoline

with ethanol. Today's ethanol industry is considerably more cost effective and energy efficient. Researchers at DOE, USDA and elsewhere have shown that the net energy benefits of fuel ethanol are clear and considerable.

The figure below summarizes results from the "Well to Wheels" study conducted by Argonne National Lab, General Motors and several other partners including two major oil companies. As shown in the figure, the energy contained in ethanol made from corn is about 1.4 times the fossil energy used to produce the ethanol, and 10 times the petroleum used. For cellulosic ethanol, the ratio of energy in the ethanol to the fossil energy used also increases to about 10 Btu in the ethanol for every 1 Btu of fossil fuel used. From the perspective of science, at least, this debate has been decided in favor of continued development of ethanol. Ethanol is proving to be a very effective option for reducing our dependence on petroleum—regardless of whether it is made from corn or cellulosic materials.



There is little doubt that ethanol will be, and should be, the first biofuel that we can use to reduce our dependence on petroleum. However, NREL and the National Bioenergy Center recognize that other biofuel options need to be developed as well.

Biodiesel and other derivatives of fats, oils and greases can make a significant contribution. Researchers at DOE and USDA have shown that the energy contained in biodiesel is 3.2 times the fossil energy used to produce the biodiesel. A wide variety of seed oils, animal fats and waste oils from all parts of the country can be converted to biodiesel. Aquatic species such as algae can also play a major role in the long term because they do not require fertile soils, can grow in brackish water, and yet algae can produce very high yields of oil. Considerable research and development will be required to realize the potential of algae as a source of oil feedstock.

There is a small but rapidly growing biodiesel industry in the United States. The growth of this industry is currently limited by a number of barriers to market penetration, including the need to develop new fuel quality standards, uncertainty regarding impact on NO<sub>x</sub> emissions, and by lack of understanding of how this new fuel affects engine performance and durability. This is especially true for new diesel engines equipped with advanced emission control technologies that will be introduced beginning next year. NREL's Center for Transportation Technologies and Systems is working to address these issues, in partnership with biodiesel producers and engine manufacturers. We, along with industry, believe additional engine testing is needed to better understand the performance of B20 (20 percent biodiesel) and lower blends in the advanced emission control diesel engines that will enter the market in the 2007–2010 time frame to meet EPA regulations. This engine test work would advance biodiesel technologies by ensuring compatibility with these new (and much different) engines.

More broadly, we believe biofuels offer significant opportunities to reduce air emissions from the transportation sector nationwide. Both ethanol and biodiesel are oxygenates and hence can reduce the hydrocarbons, carbon monoxide and soot emitted from the tail pipes of gasoline and diesel vehicles. Biodiesel and ethanol can significantly reduce toxic compound emissions. Ethanol additionally can cut by 25 percent the emissions of smog-forming hydrocarbons from fuel evaporation.

*Other Nrel Vehicles and Fuels Research*

I would be remiss if I did not note the other important research being conducted at NREL which also is contributing to the next generation of vehicles and fuels. NREL's Center for Transportation Technologies and Systems is working to address the biodiesel utilization issues noted above. Similar R&D is needed to more accurately quantify the air quality benefits of ethanol and develop engines that are optimized to operate on ethanol as well as on gasoline. A number of vehicle efficiency improvements are also being investigated including technologies to dramatically reduce fuel use for air conditioning. Other promising answers to our future transportation needs are gasoline-electric and diesel-electric hybrid systems and so-called "plug-in hybrids." Plug-in hybrid vehicles use both a gasoline engine and the electric outlet of your home to achieve fuel economy of 100 miles per gallon, or more.

*Continued Research Hastens Fuels Development*

In conclusion, let me review some key points. Biomass is the only renewable option for producing liquid transportation fuels. The U.S. biomass resource can supply a large portion of demand for gasoline and we can greatly expand the resource base when world petroleum production begins its decline. The biofuels industry can use resources from every region of the country and could become a needed stimulus for ailing rural economies. Ongoing research, like research into biorefineries, will create many new products beyond the biopower, ethanol and biodiesel we are producing today.

The President's Advanced Energy Initiative holds the promise of accelerating our work so that we can help get this industry up and running, to benefit the American people, even sooner. The initiative envisions a more aggressive research effort in all key areas: further reductions in enzyme costs, advances in process technology to reduce capital and operating expenses and advances in feedstock R&D that will reduce the cost of production, collection and transportation of biomass to the bio-refinery.

As the partnership development team leader for the Nation's research center for bioenergy, I can assure you that a sustained, high level of investment for research in bioenergy will provide major benefits for future generations. We need to keep apace with this work because biofuels are an environmentally and economically beneficial way to bridge the gap between rising energy demand and peaking oil production, while reducing U.S. dependence on imported oil. Thank you.

SENATOR BURNS. Thank you, Dr. Ashworth. I want to ask you, in your partnerships, do you also look into the usage of the infrastructure it's going to take to deliver to be used? In other words, our convenience stores, our gasoline stations, our companies, what do you see the challenges there?

DR. ASHWORTH. That's a wonderful question. And when we were talking about the administration is putting together this program for trying to understand how to get from here to there, the real interesting issue is that the first 15 billion gallons of ethanol, we already know how it's going to enter the marketplace. It's just going to go into gasoline, okay, because every car in America can run on 10 percent ethanol right now. There's no infrastructure issues there. Up to 15 billion gallons, they are already blending it into gasoline, and they will just blend a little bit more and eventually it will be nation-wide.

Above that, you have two issues. You need to have vehicles that can run on high blends of ethanol, and you need to have stores which are going to sell the raw material, namely the E-85 or whatever, and I think that's a place where the Government can have a real role. I'll be real honest with you, it's not something we work on. We're researchers, we do scientific research. But if you don't

have access to an E-85 pump, or you don't have access to the materials in your neighborhood, you're not going to use it; and so one of the things that I think is going to be one of the issues, and was addressed in the Energy Policy Act of 2005 a little bit, which was that there's now a subsidy, or a tax credit for a gas station to add an E-85 pump. They can get, I think, \$30,000 to add an E-85 pump. And most of those pumps today are concentrated in two or three States. They are concentrated in Minnesota, South Dakota, and throughout the corn belt. I think what we're going to need to see is about 30,000 of those pumps around the country in order to get to the point where everybody has access to these technologies—I'm sorry, to this fuel. And that's just going to be a matter of demand and supply and the government making it less expensive for the pump guys to provide this material.

Senator BURNS. Does your partnership include, also, manufacturers of the engines?

Dr. ASHWORTH. Very definitely. What we have at our lab, we actually work with all the energy manufacturers. Now, I mentioned we don't work on biodiesel very much, but we do work on biodiesel in engines, because the manufacturers are very interested in looking at the impact of large levels of biodiesel in their engines over time; and we have a lab that does that, runs those large scale heavy-duty engines, the kind that everybody uses in their equipment. It turns out there isn't much of an effect. That is to say it actually works quite well in those engines, and they are quite ready to run to B 20 in those big engines now.

Mr. DORR. There are actually a number of CAT generators that are now running on B 100. Could I take a crack at this?

Senator BURNS. You bet.

Mr. DORR. I think the problem with building a new industry like this is the tendency to look at the immediate pieces that sometimes we address pretty effectively but other times, in fact, they kind of get sidetracked; and I think the easiest way to bring this whole issue relative the renewable energy, number one, is national security. It is high time that we develop a renewable energy industry so that we not only have energy security, but national security. So the easiest way to frame it is to look at what the President suggested. He wants to displace a minimum of one billion barrels of oil, imported oil by the year 2030.

Stop and think about this. For the last 10 years, net farm income has averaged \$56 billion. The last 2 years has been in the neighborhood of \$75 billion. He wants to displace 1 billion barrels of oil annually, minimum. That's \$75 billion. That \$75 billion will largely all be rural originated. It will come from biomass, it will come from wind, it may come from solar rays, it may come from geothermal; but when you look at that and look at the scope of what's required to think through back to the core of your question is, what does this do for the infrastructure in the community; and when you start looking piecemeal at, well, we know we've got it with ethanol, and we know we're going to have to deal with perhaps in cellulosic, and we understand all of this, but really what we need to do, in my view, is ultimately have something akin to a Manhattan approach to integrating this 30 percent of liquid fuels into the system that becomes domestically produced. And in fact, 30 percent is a

big deal. That is more than just a marginal commodity amount that will move this market a little bit; and so I think that's the framework of this that we need to continually keep in mind as we develop policies, and as we go about implementing policies that are a result of legislation authorized by Congress, or put in place by the administration.

Senator BURNS. We understand, you know; and when we start talking about moving big loads and doing big jobs, we have not found anything to replace diesel or the diesel power plants; and I guess that's why we're talking about biodiesel today. Now, I know there is an R&D organization in Butte, Montana, that is doing very well with greases on this type stuff. In fact, they have got them operating now in Green Bay, Wisconsin. All that technology comes out of Butte, Montana. And Larry Farrar over there has done a terrific job in their R&D work. In fact, they have got several of their—that work over there in the equipment, their light equipment, but hasn't really got into the big equipment yet. So I'm going to—I know there's questions in the audience that I haven't thought of, and I'm going to conclude this hearing right now and maybe answer some questions from the audience, because you're here because of your interest in our renewables and alternatives.

I will say that I'm going to close this hearing. Anybody wanting to make comments, we will take your written comments and they will be made part of the record for the next 3 weeks.

And the reason we had this hearing is because as we go down and we rewrite the 2007 farm bill, we will have a stronger energy title. Well, along with that we're going to have to figure out, in appropriations, where we should be making our investments as far as to the advantage, I think, to the ag producers of this country. That's our first—that's our first concern is the income on the farm. A guy says there's nothing wrong on the farm except the price. And that's where we're going to—we're going to place our emphasis whenever we start making appropriations, making recommendations to the authorizing committee, and I know Senator Chamblis has already started this whole process of talking about farm produced fuels and energy, and they all have to go together.

In 2002 we had an energy title for the first time in the ag bill, and that was going to dovetail to what we wanted to do with an energy bill later on, and that didn't get passed until 2005. But nonetheless, we did do some dovetailing and there's probably more incentives in this energy bill with regard to renewables, and our biomass, than any energy bill we've ever passed. Now we go to the 2007 we will be dovetailing in, and these programs should dovetail, and we come up with some real answers that make us energy independent, where we want to be. And we want to do it in a transition that was maybe a little bit better than what Brazil went through, but they did it, but they did it with a little bit of pain. We would like to make that transition for the American people and the American farmer as seamless and as smooth as we can, increasing our farm income; and that's what it's all about. As long as we don't take our eye off the ball.

The subcommittee has received a statement from the National Center for Appropriate Technology which will be entered into the record.

[The statement follows:]

PREPARED STATEMENT OF THE NATIONAL CENTER FOR APPROPRIATE TECHNOLOGY

Dear Senator Burns: Thank you for arranging a Senate Agriculture Appropriations Subcommittee on renewable energy issues, and for the opportunity to offer these comments on the future of renewable fuels in Montana.

From its headquarters in Butte, Montana, the National Center for Appropriate Technology ([www.ncat.org](http://www.ncat.org)) has been intensely involved in farm energy issues throughout the organization's 30-year history, offering demonstration projects, research, technical assistance hotlines, publications, workshops, and websites.

NCAT has hands-on experience with the full range of energy efficiency and renewable energy technologies. For example, NCAT has promoted energy efficiency in irrigated agriculture since the late 1980s, completing over 500 irrigation system energy audits and demonstrating energy and water-saving technologies. We also manage the Montana Green Power website ([www.montanagreenpower.org](http://www.montanagreenpower.org)), the pre-eminent source of information on Montana renewable energy news and funding opportunities. NCAT's technical specialists have conducted dozens of renewable energy demonstration projects and feasibility studies on Montana farms and ranches, including wind energy, anaerobic digestion, and photovoltaics for water-pumping and other agricultural uses. At our Iowa office, we are planning field studies on sustainable switchgrass production for cellulosic ethanol.

In response to a tremendous recent increase in energy-related inquiries and requests, NCAT is substantially increasing its capacity and resources on farm energy topics. In this effort, NCAT will leverage the resources of its USDA-funded ATTRA Sustainable Agriculture Information Service. Since 1987, this service has provided over 200,000 technical responses to farmers, ranchers, and information providers around the United States by mail, e-mail, and a toll-free phone line, 1-800-346-9140. In 2005, the ATTRA web site ([www.attra.ncat.org](http://www.attra.ncat.org)) offered over 200 free publications and received over 23 million hits, with about 180,000 unique visitors each month. These visitors downloaded more than 590,000 publications.

NCAT believes very strongly that renewable fuels will play an important role in Montana's future. Although Montana is not a major corn or soybean State, the United States is rapidly expanding beyond corn ethanol and soy biodiesel. Montana is a dandy canola and camelina State. And it will most assuredly be an outstanding cellulose State.

As a latecomer to the biofuel business, Montana has a chance to learn from the experience of other States. This experience overwhelmingly demonstrates the importance of local ownership.

Local ownership means more jobs in rural communities. A 2006 study by Iowa State University showed that locally-owned ethanol plants created significantly more jobs than externally-owned ethanol plants, with job multipliers as high as 7.95. In one community with a 73 percent locally-owned ethanol plant, 143 local "induced" jobs were created, along with the 40 "direct" jobs at the ethanol plant.<sup>1</sup>

Local ownership means greater income for the producers who grow the feedstocks. Recent increases in U.S. ethanol production may have increased the price of corn by 10 to 15 cents per bushel. But the 20,000 or so U.S. farmers who own a share of an ethanol plant receive far more, in annual dividends, usually 50-75 cents per bushel.<sup>2</sup> In 2005, the State of Iowa had the fastest-growing economy in the Midwest and the second-fastest rate of income growth of any State in the country. Iowa's Governor Tom Vilsack attributes these accomplishments largely to the development of ethanol, biodiesel, and wind energy in Iowa.<sup>3</sup>

Local ownership also means more dollars staying within Montana. One study in Minnesota found that 75 cents of every dollar spent on gasoline (excluding State taxes) left the State's economy. On the other hand, 75 cents of every dollar spent on ethanol stayed within the State's economy.<sup>4</sup>

Despite the importance of local ownership for rural communities, the trends nationally are not encouraging. At least 90 percent of U.S. ethanol production coming

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<sup>1</sup> Euken, Jill, "The Bioeconomy Movement: Lessons from Iowa," Center for Industrial Research and Service, Iowa State University, 2006. Available from [www.ciras.iastate.edu](http://www.ciras.iastate.edu).

<sup>2</sup> Morris, David, "The Carbohydrate Economy, Biofuels, and the Net Energy Debate," Institute for Local Self-Reliance, August 2005. Available from [www.newrules.org](http://www.newrules.org).

<sup>3</sup> Vilsack, Tom, "Remarks to The Future of Economic Development in Rural America Conference," November 17, 2005. Available from [www.governor.state.ia.us/news/2005/november/november1705\\_1.html](http://www.governor.state.ia.us/news/2005/november/november1705_1.html).

<sup>4</sup> Morris, David, "Ownership Matters: Three Steps to Ensure a Biofuels Industry that Truly Benefits Rural America," February 2006. Available from [www.newrules.org](http://www.newrules.org).

on line in the next 3 years will not be farmer-owned.<sup>5</sup> This production will mostly come from very large plants producing over 100 million gallons per year. Plants this big are too expensive for farmers and ranchers to own.

As Wall Street money and foreign investments continue to pour into the biofuel business, there is a real danger that farmers and ranchers will be priced out of the game. The Energy Title of the 2002 Farm Bill was largely silent on issues of scale and ownership that are vital to rural communities. NCAT would like to see much stronger support for local ownership in the 2007 Farm Bill.

We believe that Montana and other States should follow the "Minnesota model," emphasizing in-State production and farmer ownership. We would like to see Federal ethanol and biodiesel incentives changed into producer payments that favor local and farmer ownership. The Farm Bill could also encourage local ownership, for example, by limiting incentives to a modest number of gallons per year—thus encouraging smaller plants.

Unlike other forms of renewable energy, biofuels development will require the direct participation and full cooperation of American agriculture. So NCAT believes that Montana and other States should launch aggressive education efforts, covering the many benefits of biofuels and emphasizing particularly the importance of local and farmer ownership. Such educational efforts could be supported within the 2007 Farm Bill.

NCAT is already fully engaged in educating rural landowners and communities about biofuels, and we are ramping up to do more. We are offering free information about biofuels through our ATTRA National Sustainable Agriculture Information Service. Farmers and ranchers can call our toll-free number, 1-800-346-9140, to speak to a farm energy specialist about biofuels or other renewable energy topics. NCAT also offers free publications on biofuels and many other farm energy topics. All of these are available at no cost, by mail or through our website, [www.attra.ncat.org](http://www.attra.ncat.org).

NCAT has organized and participated in numerous biofuel workshops throughout Montana, and we are delighted to announce that we have just received funding for an ambitious new education project, "Oilseeds for Fuel, Feed & the Future: Montana Farm Basics." We will be offering workshops and creating new print and electronic resources to inform agricultural producers about oil crops and biofuel use and production. We will also set up a mini-grant program to offset the financial risk to farmers of demonstrating biofuel use and identifying opportunities and barriers in the biofuel industry for Montana farmers. Our collaborators in this project will include the Montana Natural Resources Conservation Service, Montana Department of Environmental Quality, Montana Farmers Union, Alternative Energy Resources Organization, and the Montana Grain Growers Association.

Thanks again for the opportunity to offer these comments.

#### CONCLUSION OF HEARING

Senator BURNS. I'm going to close this hearing. Everything will be made part of the record right now.

[Whereupon at 10:45 a.m., Saturday, August 26, the hearing was concluded, and the subcommittee was recessed, to reconvene subject to the call of the Chair.]




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<sup>5</sup> Morris, David. "The Carbohydrate Economy, Biofuels, and the Net Energy Debate." Institute for Local Self-Reliance, August 2005. Available from [www.newrules.org](http://www.newrules.org).